



Microsoft Energy Core

Special Report

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Low Carbon Strategies:

Leveraging Digital Solutions to Minimize Emissions and Accelerate Low Carbon Objectives in the Energy Sector?



Energy: A green future is a digital one

This Whitepaper highlights exclusive insights harvested from the opinions and brainstorming of 28 high-level attendees at the Microsoft Energy Core's ADIPEC Industry Roundtable in Abu Dhabi on November 17, 2021. The Chatham House Rule applies. Please cite this document when using or citing any of the material.

Dramatic changes are reshaping the global energy market – in a historical blink of an eye. Intensifying pressure points to quickly shrink the industry's CO₂ footprint while protecting oft-volatile profit margins and meet rising energy demand present a very tall order. But it also offers untold economic, environmental, and social opportunities if properly harnessed. Therein lies the value of digitalization as a valuable ally – as the energy community faces its greatest overhaul yet.

Seeing is believing, as the adage goes. This simple point carries great weight in the energy transition. Before energy stakeholders can understand how to mitigate and abate their CO₂ emissions, they must be able to “see” how they impact their value chain, while sustaining energy security.

Digital tools lie at the core of lifting the veil of environmental ambiguity of operational norms along the supply chain – from research and development (R&D), to production, transport, consumption, and all the multiple links in-between.

A dual approach is best, simultaneously adopting a defensive and offensive position, roundtable participants said. From a defensive position, energy companies must use digital tools to minimize the generation of CO₂ emissions in their existing operations, such as energy efficiency. The offensive position is to bolster the environmental efficiency of energy markets by ramping up renewable

energy sources, integrating digital aids to reduce the CO₂ footprint as you go. It is far easier to instill good digital habits in a new project than it is to backtrack on existing infrastructure, though both routes are equally important.

It will be a marathon, not a sprint; this is something the energy industry must remember. Reducing CO₂ footprints takes time, especially when 70% of the world's energy is generated by fossil sources.¹ Currently, there appears to be a pervading sense of naivety in climate conversations in the energy industry, flagged roundtable participants. Several argued that the massive undertaking required to hit net zero targets at various points up to 2050 – and beyond for Saudi Arabia, China (2060) and India (2070), for example – has been underestimated. As a result, the value of digitalization is not being maximized as it needs to be to create tangible, speedy change. So, while overarching sentiment is very positive, the energy industry has no time to waste (See box: *Energy's impact*).

LOOK INWARDS TO THRIVE OUTWARDS

The energy transition will fail if the energy industry does not shine its spotlight internally – this was the overriding sentiment from roundtable participants. A swelling gap in the energy market's digital literacy is an “elephant in the room”, which has yet to be fully addressed. This multifaceted challenge includes the need to plug the “brain drain” from the fossil fuel industry into renewables and tech sectors, as well the need to improve digital awareness across all energy markets. The energy transition is rightly underway, but oil and gas will remain key markets in the Middle East till mid-century at least; up to 45% of global oil supplies will originate regionally.²

Looking internally also means diving into which skills are required in which departments within energy companies, plus how urgently they are needed. Every employee does not need to be a digital Einstein. Some will benefit from low-grade digital understandings, others

must be digitally fluent, while some will need to be digitally innovative. Identifying such tiers within the workforce is the first step for energy employers as it loops back to a crucial point in the energy sector's digital evolution – the need to boost visibility.

Thereafter, upskilling and reskilling strategies can be rolled out. Many energy companies are already taking this step, often guided by tech partners. Different routes are being explored, but all stakeholders agree on one point: the evolution of the energy industry's talent is now a strategic dimension that will directly correlate to a business's success rate in the 2022 and beyond. Middle Eastern energy companies are particularly keen on strengthening their national talent pool in support of their nationalization efforts, a core pillar in their National Visions.

Of course, this narrative does not end with training programs and accreditations, but “when the cash flows back” into the value chain, one roundtable speaker pointed out. Plus, the return on investment (ROI) can be very attractive, which is especially good news considering volatile oil prices and the economic toll of the Covid-19 pandemic on energy stakeholders' balance sheets. Generally, every dollar invested in upskilling in the energy sector can yield at least \$2 in revenue or savings.³

Enhancing digital education across all energy markets is also important. Younger generations especially seek very diversified career paths, such as

exposure to working in oil, solar, and clean hydrogen markets in the space of just a decade, for example. Ensuring that fundamental digital understanding is standardized (see below: *Speak the same language*) as much as possible means talent can move more freely between sectors, their experiences pollinating new ideas as they go. This supports the spirit of innovation and ultimately saves employers' resources – notably time and money – on upskilling every employee from the ground up on their operations. Of course, digital knowledge specific to each market will be needed, but a common bedrock of understanding benefits all. This is especially true as the job market for green energy – itself a growing mix – rapidly expands. Jobs in the renewable energy sector already reached 11.5mn globally in 2019⁴ and the burgeoning clean hydrogen market alone expected to support 140,000 new jobs in Europe by 2030, for example.⁵

Energy markets are not alone in their digital rethink of their hearts and minds. Worldwide, 1.2bn employees – more than the entire size of China's population, the globe's most populous nation – will be affected by the adaptation of automation technologies and artificial intelligence (AI) over the next ten years. This equates to 50% of the global economy and disrupts an astonishing \$14.6trn in wages.⁶ The breadth of this challenge means energy markets can investigate cross-industry opportunities to share knowledge and pin down solutions, saving precious time.

DYNAMICS IN PLAY

-8%

global energy demand in 2050 is expected, under a net zero scenario.¹ Yet the industry will be expected to service an economy twice as large – with 2bn more people. Dramatically boosting energy efficiency – including via digitalization – is the only way to reach climate goals in time.

70%

of the world's energy is generated by fossil sources. Transitioning to decrease this number and increase the 30% that is currently created via green sources is a big undertaking – one that leans heavily on digital guidance.²

26%

of the world's 51bn tons of CO₂ emissions worldwide are generated by the energy industry.³

135

countries have committed to net zero targets so far – 68% of the 198 nations tracked – as have 32% of the world's 2,000 largest publicly traded companies by revenue.⁴ A blend of the energy industry's expertise and better adoption of digitalization are critical to making these goals on paper a reality.

¹ International Energy Agency (IEA); ² Roundtable participant; ³ Roundtable participant; ⁴ ZeroTracker;

Areas to watch?

Digital solutions can help fossil fuel operators gauge risk, including the growing spotlight on stranded assets – estimated at over \$1trn in coming decades.¹ Tools can be used to both understand such assets' existing value and to understand how they can be revamped to support the energy transition. For example, gas pipelines that digital tools reveal are still in good condition can be tweaked to be used for clean hydrogen. Plus, energy stakeholders must tread carefully around “ready to go” digital tools and strategies. It is rare to get a digital solution that can just be “plugged in” to work seamlessly, especially in energy companies with complex structures. The promise of digital

strategies “magically working” immediately tends to result in two to three years trying to fix it, roundtable participants warned. Every digital solution requires a broader ecosystem to maximize its effectiveness; the talent who can best operate, and robust data management protocols, for example. Tailoring digital solutions to suit companies' nuances takes time and expertise (the value of energy-tech partnerships). But the effort upfront pays off, both in terms of balance sheets and stress. It is also important to remember that digital strategies for mass energy supplies will differ to those using decentralized systems – an area that energy stakeholders need more clarity on.



SPEAK THE SAME LANGUAGE

The value of standardizing data is not a new conversation, but it is an increasingly urgent one. As the volume and complexity of the global energy basket expands, so does the need for proper data management (PDM). Energy companies must work alongside technology companies to start tidying their internal data processes – a particularly big undertaking for international companies with cross-border operations stretching back decades. The same applies to instilling standardized data practices within existing or new partnerships, such as an agreed route among all employees on how to measure, report, store, and analyze energy metrics. In turn, this increased transparency drives greater flexibility and innovation, enabling partnerships to achieve far more than before – a win-win for all.

This feeds directly into the finalized Paris Rulebook during COP26, the world's largest climate gathering held in Scotland in early November. There, the 'enhanced transparency framework' (common reporting of emissions and support) was agreed. This is a new mechanism and standards for international carbon markets and common timeframes for emissions reductions targets – an impossible task without digitalization. The same applies to the decision by more than 100 nations during COP26 to slash methane emissions by 30% by 2030, compared to 2020 levels. Consider that 98% of humanity's methane emissions are generated by the oil and gas sector, coal mining, plus wastewater management, solid-waste management, and agriculture.⁷

Standardization is also essential to upgrading how the energy industry reports its data, especially as the broader energy-tech-climate nexus rapidly advances. Uniformed and real-time reporting is key, as seen in the financial community. This elevates speed, transparency, and analysis. This then drives regulatory clarity, quick decision-making, and in turn, a greater ability to shrink CO₂ footprints (such proactivity is also very appealing to investors).

Being able to dynamically understand the real-time environmental impact of



Energy's impact?

It is possible to cut 30 gigatons (GT) of GHGs annually by 2030 by addressing six sectors that can collectively reduce 29-32 GT CO₂e and limit temperature rise to 1.5°C – energy being one of them. From energy alone, the industry can cut 12.5GT of GHGs per year¹ – with no need for new inventions, just using the tools available today. This means energy has the potential to account for a staggering 43% of the global GHGs that must be reduced worldwide to hit climate goals. Therein lies a monumental opportunity for energy stakeholders to do what they have thrived at for millennia; to innovate. In the 2020s and beyond, that means smartly leveraging digitalization.

¹ UNEP

greenhouse gases (GHGs) in a supply chain creates an operational baseline from which companies can stake their planned improvements and goals – again, visibility is paramount. At a time when net zero targets are set nearly daily, having a quantified understanding of what is truly achievable will support corporates' environmental credibility and reputations.

Adopting smart storage systems must also be addressed. These new data sets are built in an interconnected manner atop of one another – rather than a fragmented ecosystem. Progress is underway, but there is still a lot of work to do. The amount of data created and replicated worldwide experienced unusually high growth in 2020 due to the pandemic, yet less than 2% of this new data was saved and retained into 2021. Energy stakeholders must ensure that they do not fall into the same bad habits.⁸

COLLABORATION PAYS OFF

The value of sharing has never been greater – a point energy-tech and energy-energy partnerships must all build upon. For example, Schlumberger and Microsoft expanded their partnership to bring open, enterprise-scale data management to the energy industry. Partnership introduces industry first, AI-enhanced cloud native solution for the OSDU™ Data Platform optimized for Microsoft Azure. And in Oman, the Ejaad platform has worked "amazingly well" since its launch in 2017, described a roundtable participant. Ejaad is a membership-based virtual collaborative platform where industry, academia, and government can interact and engage in energy-related research and innovation activities. It works as an enabler or a marketplace that connects academic research and know-how to



NOCs' push

National oil companies (NOCs) in the Middle East are "ramping up their speed with a dedicated focus to work with others on digital growth," roundtable participants flagged. For one, Saudi Aramco – the world's biggest oil exporter – puts digitalization as one of the prime focuses in its newly-launched Future Investment Initiative. Aramco also, alongside Siemens Energy and the World Economic Forum (WEF), launched a report on Cyber Resilience in the oil and gas industry this year, sharing more than 40 executives' experiences – an important mitigation step against one of the greatest threats to the industry.¹ In the UAE, state-owned ADNOC's Panorama Digital Command Center generated more than \$1bn in value in just five years. Panorama is helping to ensure business continuity by enabling real-time decision-making through secure remote access to data and analysis across ADNOC's value chain.² Plus, Dubai-based ENOC Group has unveiled plans to invest AED250mn (\$68mn) of its 2021 expenditure to enhance its digital transformation strategy. The Group also introduced 'Masar', its digital transformation program designed to offer complete digital integration of all its divisions.³ These developments just showcase a small number of the many developments occurring across the region. While progress is building, all NOCs – no matter their size, their goals – must tread smartly to ensure that the digital steps they take now create sustainable and transparent roadmaps with highly organized data processes.

¹ Saudi Aramco; ² ADNOC; ³ ENOC

industry needs, and vice versa. The key research areas are energy, oil and gas, renewables, and water. So far, it has enabled the deployment of very interesting technologies, in just one or two years. One of the spinoff efforts focuses purely on data management and big data, working with different organizations. This collaboration serves as a noteworthy example of the positive power of connecting R&D to local challenges that can be solved by local industry by local people. This approach is also very aligned to the region's

National Visions.

Often when thinking about the energy transition, energy stakeholders tend to think in absolutes – striving for the perfect situation, roundtable participants emphasized. But the real risk is letting 'perfect' be the enemy of good, i.e., waiting for the ideal dynamic, which almost never happens. Instead, energy companies and their tech allies must keep seizing opportunities. Vast steps can be taken to start shrinking CO₂ footprints in 2022 – as long as energy stakeholders act now with an open mind.

¹ Roundtable participant; ² BP Energy Outlook, Middle East; ³ PwC Luxembourg; ⁴ International Renewable Energy Agency (IRENA); ⁵ European Commission; ⁶ World Economic Forum (WEF) ⁷ McKinsey; ⁸ International Data Corporation (IDC)

2026

will see a 11.28% compound annual growth rate in the big data analytics market across the global energy sector.⁵ Properly leveraging this market in the energy space can significantly bolster environmental efficiencies.

100bn

worth of storage space on DVDs equates to the 400bn gigabytes of growth per month in global data traffic that is anticipated between 2017-2022.⁶

4%

of global GHG emissions are being created by the world's digital activity.⁷ The environmental impact of digital tools – a vital aid for energy companies – must also be addressed.

41.7%

growth rate in the global market for digital twins is anticipated between 2021-2027, reaching \$63.5bn.⁸

2023

will see Dubai host COP28 – a reputational win for what is also OPEC's third largest producer. This platform offers Dubai and the wider UAE a well-earned platform to showcase its increasingly green energy basket. This is especially notable considering petrodollars have historically propelled the UAE's economic surge, meaning this is the second overhaul of its energy economics – despite it only just celebrating 50 years of independence.

33rd

is the UAE's respectable ranking on the Global Innovation Index 2021, out of 132 nations. The nation also takes 12th place for its Information and Communication Technologies (ICTs) and 59th for Knowledge and Technology outputs.⁹

⁵ Mordor Intelligence; ⁶ Ernst & Young; ⁷ Ernst & Young; ⁸ Businesswire; ⁹ Global Innovation Index



Microsoft Energy Core ADIPEC Industry Roundtable

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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.

■ 12x Global Energy Operators

■ 3x Academic Institutions

■ 10x Founding Technology Partners

■ 1x Industry Body



