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A Frost & Sullivan Virtual Think Tank Article

Beyond Energy Efficiency: Digital Transformation Moves Past Optimizing Processes and Upends an Industry

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For well over a century, the energy industry was a consistent cornerstone of the national economy. The industry was not immutable: power and oil prices varied, at time fluctuating wildly; technology continuously improved safety and efficiency; deregulation impacted aspects of the market; and merger and acquisition activity was robust. However, the overall structure of the market changed little, dominated by large regional and multinational players that were either in the power or oil & gas space, operating via one-way transmission of products and services from provider to consumer.

The growth of new technologies and data-driven business models is now upending the energy industry. In under two decades, renewable energy has begun replacing fossil fuel-generated power: by 2025, roughly 42%¹ of the world's power will be from renewable sources. On-site power generation and storage, coupled with new business models, is creating a matrix of suppliers, buyers, “prosumers”² and third parties, replacing the old mono-directional system. And the rapid adoption of renewable power by oil and gas companies blurs the line between upstream and downstream segments of the market, as both verticals increasingly view themselves from the lens of what they provide—energy—rather than how they create it.

Frost & Sullivan explored this new transition, and examined how data both enables and complicates it, in numerous discussions with industry participants. Mike Bates, the global general manager for energy at Intel, noted the confluence of the oil and gas industry and traditional electric power markets³: “It’s beginning to be this converged market” he said, “where the big oil and gas companies are looking at energy more broadly, deploying renewable, clean energy services directly to commercial and industrial users. They’re moving into residential services ...and EV [electric vehicle] fast charging for retail.” Bates continued, discussing the implications this had for data in the industry: “We’re going to be seeing in the coming years... much more data, different types of data, more regulations, [and] more, different types of competitors, facing the market.”



Data Is Enabling—and Complicating— Industry Transformation

Tracy Beam, strategy and transformation advisor from Strategic Transformation Partners, who has worked extensively with Chevron and other industry majors, expanded on Bates' point about data playing a pivotal role in the industry. "Pure play energy oil and gas companies are really becoming tech companies" Beam told Frost & Sullivan, saying the industry has already embraced IoT and is now going beyond it. "Everyone is now working together across all these different platforms within their organizations... they're operating in a very different mindset than they used to."

A director of supply chain transformation for a major oil & gas company agreed, noting the industry has already been leveraging and optimizing data with its traditional technologies to increase efficiency: "whether it is remote operation, remote monitoring, remote diagnostics, reduced cycle times, higher production, or releasing more oil and distributing it an equitable way that support the supply chain." He noted that by utilizing existing data but running it through a different algorithm "we were able to unlock 30% more reserves." The head of innovation for another major oil and gas company stated that the benefits from technology-driven improvements can be significant, such as leveraging artificial intelligence (AI) to help find new basins, which used to take over 90 days and now could be done within 24 hours.

Moving forward, data utilization will go beyond current assets to help renewable energy owners and operators increase returns and mitigate inherent technical challenges.

Intermittent power generation is a major issue for solar and wind power. Advanced data and analytics can help position assets to get the most sun or best wind direction, for example, or intelligently store and release power guided by AI-based predictions for consumption and pricing.

IT/OT Chasm Challenging, but Narrowing

While data is instrumental in optimizing new and existing power technologies and creating revenue streams, it also comes with its own set of issues. The “IT/OT convergence” (confluence of information and operational technologies and teams) is often cited as a main challenge to any industry undergoing digital transformation. The gap often stems from a lack of coordination and shared goals between in-house IT teams and operations: put simply, IT teams often want to ensure the most secure and consistent application of data and technology, and OT teams prioritize safe and efficient operations. While these goals are not mutually exclusive, having different priorities can put teams at odds. Automation, advanced analytics and AI can help bridge these gaps with solutions that optimize operations and create intuitive user experiences, while also being scalable and secure. They can provide very tangible improvements to processes very quickly. As the O&G head of innovation noted, advanced technology can “remove the mundane and manual, tedious tasks that our scientists or engineers are doing” and expedite those tasks 10 to 100-fold. At a more sophisticated level, AI-driven solutions can enable better strategic decision making, from managing assets to managing vendors, and getting better visibility across operations and the entire organization.

John Archer, chief architect for energy at Red Hat, noted not all IT/OT challenges are technical. However, a smart technical solution can also address what is at the heart of people’s concerns, which is often loss of control over operations: “it’s cultural wars at some level...but because we [Red Hat] are about reliability, it enables the OT guys to leverage these technologies for what makes the most sense for the business.”



Another IT/OT challenge that can be addressed with technology is the increasing skills shortage across both energy and IT. Bates notes: “The skills shortage, in both IT and OT, is something we've been talking about in oil and gas industry for over 10 years, and certainly we see on the IT side as well.” He believes this can be mitigated by increasing the value derived from assets “whether you're talking about a wind turbine or a well, by decreasing cost for O&M, through preventative and predictive maintenance” for example.

Once that IT/OT gap is bridged, energy companies still need to ensure the advanced technical solutions they adopt will be secure and future-proof. Roberto Minicucci, senior director of product and OT security at Baker Hughes, says the combination of information security and industrial security is like “a perfect storm against the oil and gas vertical” due to the complexity of the industry. Along with security, digitally transforming operations needs to be scalable to address future changes in the organization and industry overall.

Leveraging a cloud infrastructure is a rapidly growing trend in the energy industry, as it helps businesses scale up (or down) their data needs without having to build out their own physical data centers. Cloud-based and endpoint-security solutions are also now comparable—if not superior to—many on-premise security strategies.

However, as Archer from Red Hat says, a combined cloud and on-prem solution is common. “I think ‘cloud’ is different for different folks. A lot of people have done some workload percentage on public clouds, it was lift and shift... For other folks, its building your applications in a cloud native way.” But at the end of the day, cloud is about “improve performance, lower your costs and go faster, those are the things that people want.” He also notes that despite the rapid move to cloud, “no one has been able to turn off their data center” and hence having strategies that bridge infrastructure, both in terms of operations and security, is critical.

Market Change is Enduring, Market Leadership is Not

The energy industry is clearly on a trajectory of changing at an increasing rate. How power is generated and sold, and by whom, will look more different twenty years from now, than how today's market looks when compared to twenty years ago. Major owners and operators of renewable energy have expanded from utilities to include oil and gas majors, large tech companies, individual homeowners, and third-party aggregators. Technology is driving rapid advancement in operations for both new and existing assets, as well as creating different business models and ushering in new market competitors. The lines are blurring, both at the macro level between oil and gas and utility players, and within businesses' IT and OT teams.

The entities that can attain, or retain, market leadership positions will be the ones that are able to intelligently leverage data and technology. They will need to understand that strategies must focus on outcomes and shared organizational goals, not individual team priorities. They will need to ensure scalability and security transcends platforms and infrastructure. And they will have to see themselves as catalysts for change, rather than simply reacting to it. As Bates from Intel puts it "Whether it's happening seamlessly and easily, or it's kicking and screaming, it is happening, and I think the market drivers are causing it."



Endnotes

- 1 Source: Frost & Sullivan research
- 2 Frost & Sullivan defines a “prosumer” in the energy industry as follows: “Investments in smart grid infrastructure have encouraged active participation by power consumers. They have evolved from passive consumers to active producers, commonly termed as ‘prosumers’ in the energy market”. Frost & Sullivan, Rise of the Prosumer, March 2015
- 3 Quotes from this article are from Frost & Sullivan’s Virtual Think Tank series Integration and Alignment of IT and OT Solutions, and from conversations with market participants, unless otherwise noted.

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