

The Role of Technology in Energy Diversification for Oil and Gas Companies



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Introduction

In July 2023, the earth reached its hottest average temperature at 17.18°C (62.9°F), an ongoing (and devastating) trend that will change our lives forever.

With rising temperatures and out of control weather conditions, "once every hundred years" events happen yearly. Sometimes every month. And in some communities, it's become the norm.

As a result, the pressure to lower greenhouse gas emissions and sustainably power our planet is immense, with oil and gas companies in particular, feeling the heat. Forced to support a dual model of building for the future while powering the present, the energy industry must diversify.

Energy Diversification

Energy diversification, or energy mix, increases energy security, allowing countries to withstand market forces that result in interruptions to supply or extreme price increases. The impact on the energy model in Europe due to the conflict in Ukraine is an example of market disruption.

Diversification is also the path forward in our sustainability efforts, expanding beyond traditional fossil fuels to power the planet using clean energy alternatives.

In this whitepaper, we examine all the market factors that drive clean energy diversification, how oil and gas companies are evolving, and the role technology plays in helping the industry (and the planet) reach and hopefully exceed its sustainability goals.



What is driving diversification in the energy sector?

Along with hitting carbon emissions targets, oil and gas companies must evolve to support consumer choice, which is firmly behind sustainable energy models. Investors must also be satisfied, with environmental, social, and governance (ESG) standards that influence where the money will go. The evolution of technology is another factor. Along with helping to ease the transition, technology provides the framework upon which sustainable energy infrastructure is built.



Policies, regulations, goals

While each country has its regulatory bodies to mandate how the energy industry works, including emissions, the [International Energy Agency \(IEA\)](#) helps shape global policies that enable the world to meet climate, energy access, and air quality goals.

According to the IEA, oil and gas production, transport, and processing will emit 5.1 billion tons of CO₂ in 2022. Based on the agency's Net Zero Emissions by 2050 Scenario, the emissions intensity of these activities must fall by 50% by the end of the decade.

Combined with reductions in oil and gas consumption in this scenario, overall results could produce a 60% reduction in emissions by 2030.

These are lofty goals for the energy industry and the jury is still out on whether they will be achieved.



5.1 billion tons

CO₂ produced in 2022
by Oil & Gas



Social

People are no longer accepting a carte blanche approach to how goods and services are produced, making voluntary changes to habits and lifestyles to help offset the impacts of climate change.

These trends are most evident with members of Gen Z and people in the developing world, with over 45% wanting to change their lifestyle "a great deal" to be more environmentally friendly. These sentiments are shared globally.

For oil and gas companies, changes in consumer behavior drive how people use energy. Good examples include the rapid adoption of e-vehicles (EVs) and the decentralization of energy grids, where consumers use alternative production methods such as wind and solar to generate energy locally.

People want to do the right thing and are willing to change how they live (and how much they pay) to do it. With demand for traditional energy declining, oil and gas companies must diversify to satisfy the market, remain relevant, and, most importantly, support the planet.



Source: Courtesy of GreenBiz Proof Points

Economical

ESG measures incentivize energy companies to support sustainability, connecting investment dollars with a positive track record of doing the right thing.

Many financial institutions support ESG principles. Here are some examples:

- At [COP26](#) in 2021, an initiative was announced comprising 450 member firms from the global financial sector (with [USD 130 trillion in assets under management](#)), pledging support for a net zero future.
- [Societe Generale](#), a long-time investor in energy projects, set a target to invest USD 120 billion by 2023 in energy transition projects.

The opportunity to attract new and meaningful investors is a critical financial incentive for the sector's diversification.

Technological

In years past, technology within a fossil fuel-based energy model focused on optimizing productivity with little regard for environmental impacts. But today, technology is one of the biggest drivers in the shift towards sustainability.

Innovations are already driving improvements and lowering carbon emissions within existing operations (artificial intelligence, connected devices, automation, real-time data, etc.). Advances in solar, wind, and other renewable energy sources provide the industry with a viable path forward, allowing oil and gas companies to diversify within clean energy sectors while maintaining the status quo.

If policy, social, and economic factors provide the impetus for change, technology is how we will achieve it.

Why is energy diversification challenging?

It would take more than one paper to examine the world's challenges in transitioning from fossil fuel to clean energy, with impacts differing by country and socioeconomic factors. For example, middle-income developing countries that rely on oil and gas revenues must diversify their entire economies, supporting impacted workers and communities while reducing reliance on gas and oil.

Energy companies face their own set of unique challenges within this mix. Top of the list is maintaining the status quo, continuing to supply fossil fuels and related services while building new, clean energy models for the future.

Technology plays a critical role for oil and gas companies in achieving their sustainability objectives. Not only in support of diversification but to continually optimize the reduction of greenhouse gas emissions within the existing business. Without the proper infrastructure in place, the path forward is difficult and expensive.

Legacy technologies and infrastructure

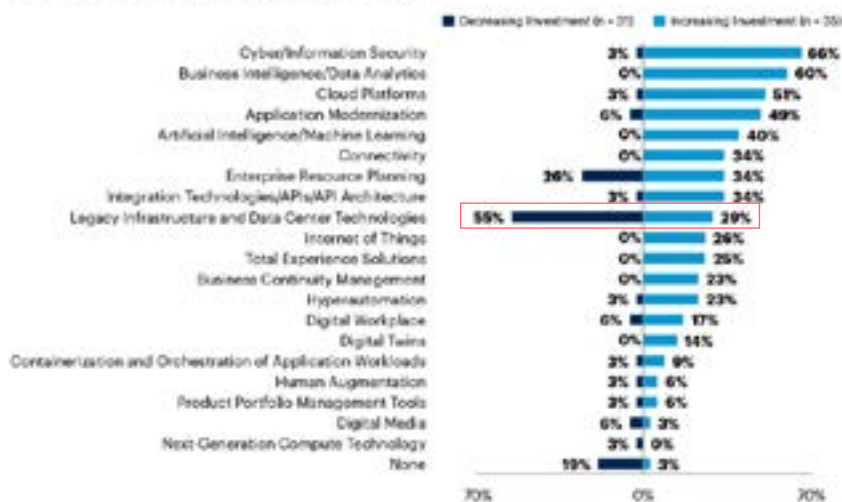
Technology

Oil and gas companies are geographically diverse, asset-intensive, and depend upon a specialized workforce that spends most of its time in the field, attending to equipment and ensuring the business remains operational.

Existing technology to support these activities is often piecemeal, reflecting changes over time. These environments are compounded by the slow adoption of nascent technologies to support current and future operations.

More importantly, legacy infrastructure does not serve the energy diversification initiatives many oil and gas companies are undertaking. Data from a recent Gartner study that surveyed CIOs and technology leaders from oil and gas companies reflects how technology investments are changing with the times:

Changes in Technology Investments
Percentage of Oil and Gas Respondents



n varies by question, Oil and Gas CIOs and technology executives answering, excluding not sure
 Q. What are the technology areas where your enterprise will be spending the largest amount of new or additional funding in 2022 compared with 2021?
 Q. What are the technology areas where your enterprise will be reducing funding by the highest amount in 2022 compared with 2021?
 Source: 2022 Gartner CIO and Technology Executive Survey
 T5602_5



Infrastructure

Existing **infrastructure** must also transform as the world shifts to clean energy sources. For example, increases in electrification will require more high-voltage transmission lines to transport and distribute electricity from rural wind and solar power plants.

Grids will decentralize, rendering traditional, larger-scale energy generation infrastructure redundant as solar, wind, and other sources create energy at the local level. In these scenarios, smaller distribution lines and transformers are required for last-mile electricity delivery.

Hardware is another factor. For example, once the grid is decentralized, customers will need inverters and other components to support home batteries, EVs, and solar panels that feed excess energy back to the grid.

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Developing business capabilities and reskilling the workforce can help capture the full potential of returns. More power engineers will need to be trained to work with new technologies, and so will a workforce that understands power markets, regulatory frameworks, and customer needs in the energy transition.”

McKinsey, February 2023

Workforce experience and skills

With so much change in energy models and technologies, reskilling the existing workforce and hiring people with net new skills is another consideration for energy companies.

Those organizations already implementing digital strategies supported by new advances such as AI, automation, and IoT, for example, will experience a lighter lift in the transition to energy diversification, with workforces that are already up to speed.



Early-stage diversification: forward (and reverse) trends

Change is already underway. Energy companies are actively expanding their portfolios to invest in the sustainable power value chain, achieving a more diverse energy mix that supports the path forward.

However, oil and gas investments in clean energy remain sub-optimal, with pressure on energy companies to do more.

Some of the largest oil and gas companies are walking back their clean energy commitments. For example, **BP has lowered its projected annual spending on renewables** to up to \$5 billion by 2030, out of a total group budget of up to \$18 billion—versus \$6 billion out of \$16 billion under its previous update in 2022.

These shifts are attributed in part to changing market conditions. For example, with disruptions in supply due to the conflict in Ukraine, governments are pressuring major oil and gas companies to boost production to help offset the deficit.

As diversification continues to expand, stronger energy security will safeguard against these scenarios in the future.

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The oil and gas industry's capital spending on low-emissions alternatives such as clean electricity, clean fuels, and carbon capture technologies was less than 5% of its upstream spending in 2022"

IEA, May 2023





Source: Shell Energy and Innovation

International Oil Companies (IOCs)

Large international organizations have the money and scale to position themselves as frontrunners.

A good example is Shell, with a global diversification strategy that includes a range of investments and acquisitions in support of renewable energy solutions (solar, hydrogen, wind, EV charging, carbon capture and storage, and others).

According to the Shell website, the company has about 50 gigawatts of renewable generation capacity in operation, under construction, and in the funnel of potential projects.

National Oil Companies (NOCs)

While public attention tends to focus on the IOCs, NOCs (fully or majority-owned by national governments) account for well over half of global production and an even larger share of reserves.

Petroleo Brasileiro SA (Petrobras) in Brazil, an integrated oil and gas company and a leading NOC is actively stepping up investments in renewables. Recently appointed CEO Jean Paul Prates, will [oversee a strategic shift to more renewable energy projects](#).

It's important to note that while there are some high-performing NOCs, many are poorly positioned to adapt to changes in global energy dynamics due to socioeconomic and other factors.

Suppliers & Service Providers

Oil and gas companies are not the only entities impacted by energy diversification. The industry includes thousands of suppliers and service providers who must redefine how they do business. Many are responding proactively to the change.

Industry Use Case: SPIE Oil & Gas Services (OGS)

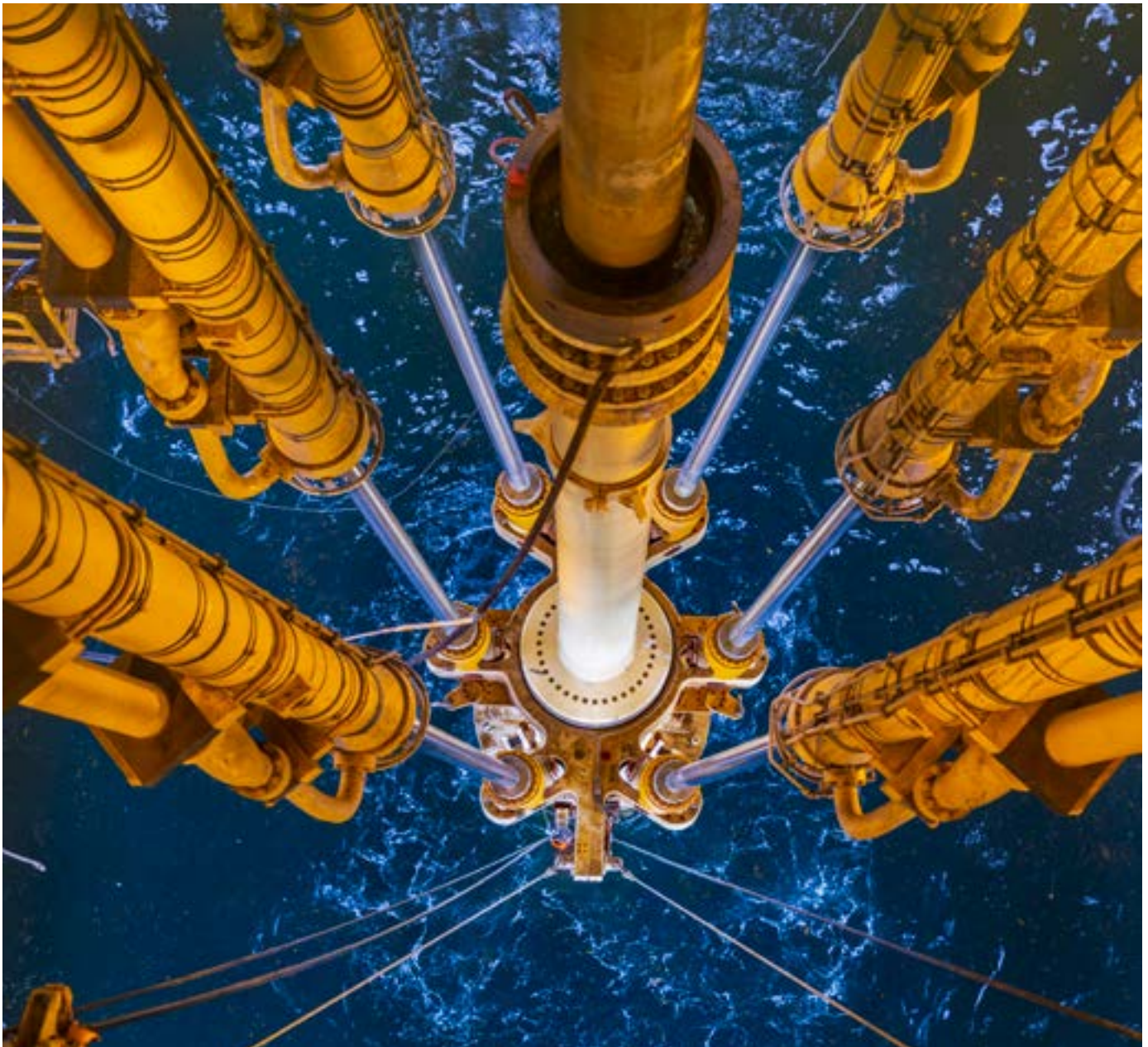
SPIE OGS specializes in energy production infrastructures—designing, installing, starting up, and maintaining them for oil and gas operations. The company is a subsidiary of SPIE, rated among the top 3% of organizations within its sector, and rewarded for the past eight years with an [EcoVadis Gold](#) rating. The company's corporate policy places [sustainable development](#) at the heart of its growth strategy.

[SPIE OGS](#) replaced its legacy infrastructure with IFS to standardize processes and unify the business, with a planned transition to the cloud in 2024. By consolidating its operation and delivering a digital business model within the cloud, SPIE OGS is well-placed to accommodate the many changes the industry will undergo in the shift to energy diversification.

Technology advances that support diversification

While AI, machine learning, connected devices, real-time data, and other innovations are absolute requirements in supporting a [sustainable energy model](#), some oil and gas companies already leverage these advances to create efficiencies within their existing operations.

For these organizations, the transition will be easier. Initial investments in modern infrastructure have already begun. Relevant technologies have been implemented and are actively used by a properly trained workforce with the appropriate skills, providing a seamless transition.



Here are three examples of how technology supports our path to a sustainable future:

Asset Management

Today, companies within the oil and gas sector rely on contemporary, cloud-based enterprise asset management technology (EAM), supported by AI and automation, to deliver essential efficiencies across the operation. Data from different assets, sensors, and other connected devices are analyzed in real-time, triggering alerts to examine and escalate responses as needed.

Planning and scheduling functions to service and maintain assets—previously time-consuming and manual processes—are automated. Dynamic adjustments occur in real-time based on service call frequency, urgency, and regularly scheduled work.

While asset types may change within a sustainable energy model, the need to monitor and manage large numbers of components remains an essential service. If anything, the asset load will only increase. For example, the average utility-scale wind turbine contains **roughly 8,000 parts**.



Industry Use Case: Moreld Apply

An offshore construction contractor, [Moreld Apply](#) relies on IFS to support modification and maintenance contracts for some of the largest operators in the North Sea, with typically 15-20 offshore operations underway at any given time.

"Our expertise spans both designing and optimizing complex systems and processes, and managing and monitoring the performance and maintenance of assets," stated Kjell Jarle Sandve, Information Management Manager at Moreld Apply. "These areas are increasingly important as customers look to transform their revenue streams with renewable energy projects and investments."



The systems and project execution models that are possible through our use of IFS, are also supporting other Moreld-owned sister companies who are entering the renewable energy sector."

Kjell Jarle Sandve,
Information Management Manager

[Read the full story>>>](#)

Cloud & Digital

The future of energy will be digital and cloud-based. However, according to [McKinsey research](#), while almost every oil and gas company has been running digitalization projects across various parts of its operations, 70% remain in the pilot stage.

But some energy organizations are not lagging, investing in enterprise technology that supports on- and offshore environments while delivering the digital capabilities and efficiencies needed for existing and future operations.

Industry Use Case: BW Offshore

BW Offshore is one of the world's leading providers of floating production services to the oil and gas industry, with 1800 users across 13 countries. The company is fully engaged in the [transition to renewable energy sources](#), actively developing new low-impact solutions for clean energy production.

BW Offshore implemented IFS to optimize and streamline its operations, with greater visibility and control over its projects.

For example, with a fully digitalized enterprise, BW Offshore maintains continuity across replicated environments between onshore and offshore platforms. "Data replication is paramount in our business and needs to remain stable," stated Ole Ivar Gundersen, ERP System Manager at BW Offshore.

As the industry shifts with energy diversification, these capabilities will support the company's progression to a sustainable business model.



We want to stay at the forefront when it comes to IT and digitalization and deploying the latest version of IFS supports that. The new features will streamline our business processes and make us even more efficient"

Fritz Ekløff,
Head of IT & Systems

[Read the full story>>>](#)



Data Analytics

As **cloud** and digital applications increase, so does data generation, an absolute requirement in delivering critical business insights to the operation.

For example, some energy diversification models will result in decentralized grids. Data will be an essential factor in optimizing how these systems work, with AI predictions and automation directing the distribution of energy resources across the network. These data-based insights will also help determine when excess energy should be stored for future use or sold back to the grid.

Oil and gas companies grappling with legacy infrastructure, without the ability to manage large data loads, are incapable of achieving this future state. But what if legacy technology wasn't a factor?

Industry Use Case: Torresol Energy

Our final example provides us with an intriguing glimpse into the future. Torresol Energy, a developer of renewable energy and alternative energies, is a new, well-capitalized venture that began with no existing installed base of technologies.

Torresol is a perfect example of how a wholly sustainable energy company works. With a "clean sheet," the organization chose the technology best suited for its diverse operations.

Torresol selected IFS as a single, integrated system to support project/asset management, financials, document management, and supply chain. The company is relying on this infrastructure to achieve its ambition to develop solar power globally through investment and new technologies, reducing the cost of future plants.



We needed an enterprise system able to incorporate aggregated data taken from the CDS. We make great use of KPIs. We need that data to monitor KPIs relevant to the plant's operation and maintenance, including systematic inspection, detection, and correction of incipient failures."

Alberto Vázquez,
Planning and Cost Controller

[Read the full story>>>](#)



Technology advances that support diversification

While it's natural to focus on the changes the industry must undergo to achieve energy diversification, oil and gas companies have deep domain expertise and years of practical experience that must be leveraged.

Accessibility to New Technologies

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The resources and skills of the industry can play a central role in helping to tackle emissions from some of the hardest-to-abate sectors. This includes the development of carbon capture storage and utilization (CCUS), low-carbon hydrogen, biofuels, and offshore wind. Scaling up these technologies and bringing down their costs will rely on large-scale engineering and project management capabilities, qualities that are a good match to those of large oil and gas companies. ”

The Oil and Gas Industry in Energy Transitions, **IEA**, January 2020





Existing Infrastructure

Not every project needs to start from scratch. The industry has extensive infrastructure it will repurpose to support sustainable energy generation.

A good example is fossil fuel assets such as offshore oil rigs. Rather than paying to decommission the equipment (or worse, stranding it), the industry is converting the infrastructure to support wind turbines.

By repurposing, the equipment has a new lease of life, while offshore renewable energy operations save time and money.

Additional Benefits

Along with existing relationships with energy customers and stakeholders, the industry has deep experience managing on- and offshore projects. It also has an excellent track record in sustainable fuel production and transport. For example, hydrogen. Many companies are well-versed in production, storage, and hydrogen transport based on existing refining and chemical processes.

Due to increasing pressure to lower emissions from existing operations, the industry has established effective decarbonization models, including renewable generation, energy retail, batteries, and carbon capture.

Finally, having created the fossil fuel energy paradigm, industry representatives have much to contribute to the design of, and transition to, a global sustainable energy model.

Next Steps

While we are in the midst of fundamental change, there is alignment between the infrastructure and processes we use to generate energy today and how we must do it in the future.

For example, clean energy will be produced across many different regions and geographies, flowing from on- and off-shore locations. It will require massive installations comprised of thousands and even millions of assets managed by skilled and competent workforces.

IFS customers within the oil and gas industry recognize technology's role in achieving these outcomes. To remain leaders within the industry, these companies are actively evolving to support a clean future today.

[Read more stories](#) about IFS customers in the energy sector, or [visit our website](#) for more information.

About IFS

IFS develops and delivers cloud enterprise software for companies around the world who manufacture and distribute goods, build and maintain assets, and manage service-focused operations. Within our single platform, our industry specific products are innately connected to a single data model and use embedded digital innovation so that our customers can be their best when it really matters to their customers – at the Moment of Service™.

The industry expertise of our people and of our growing ecosystem, together with a commitment to deliver value at every single step, has made IFS a recognized leader and the most recommended supplier in our sector. Our global team of over 5,500 employees every day live our values of agility, trustworthiness and collaboration in how we support thousands of customers.

Learn more about how our enterprise software solutions can help your business today at ifs.com.

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