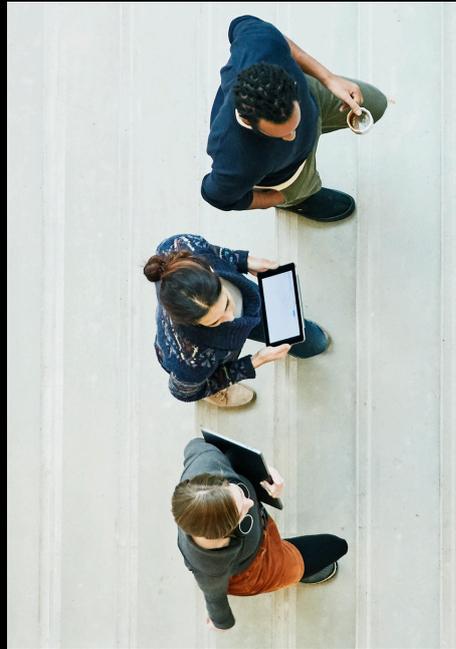


Executive Brief

The E&P Industry of the Future



Foreword

The global energy landscape is undergoing profound transformation, shaped by shifting market dynamics, technological advancements, and the accelerating need for sustainable energy solutions. The Exploration & Production (E&P) sector stands at the forefront of this evolution, navigating the complex interplay between operational efficiency, resource optimization, and the broader energy transition. This brief, produced by S&P Global Commodity Insights in collaboration with the European Association of Geoscientists and Engineers (EAGE), explores the immediate opportunities in 2025 and the long-term transformations that will define the industry over the next five to ten years.

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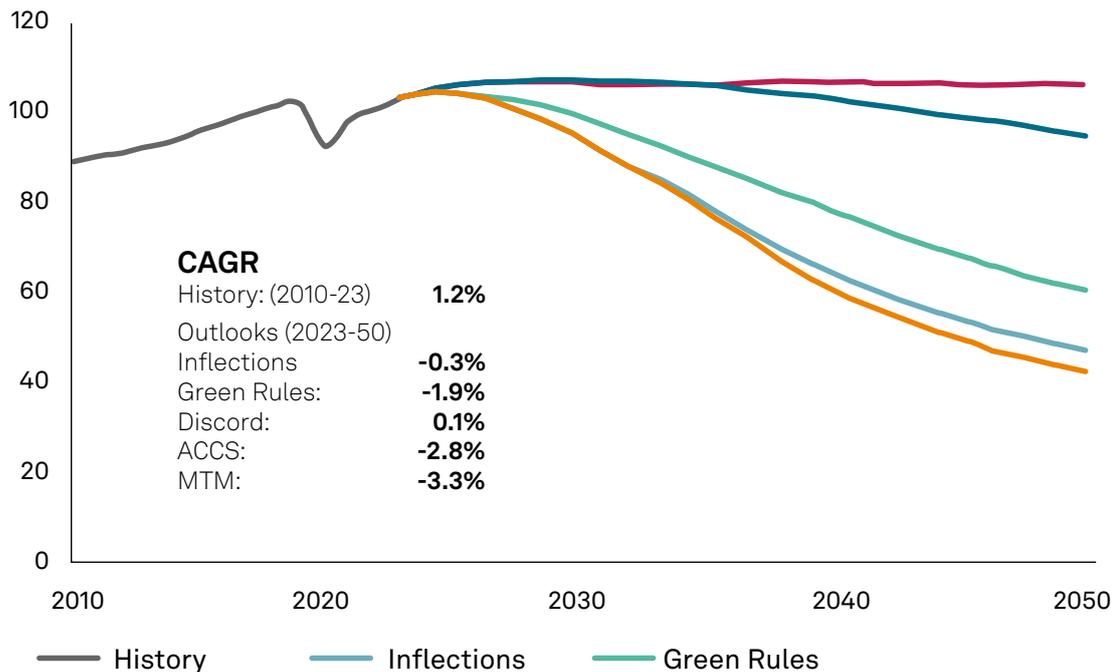
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An Industry in Transition or Transformation?

The upstream E&P sector has faced challenges over the last decade, including a downturn, the energy transition, and COVID-19. The industry is resilient but must address questions about its future shape and size as it considers factors such as expected continued demand beyond 2050, workforce demographics and capabilities by 2035, and the role of technology in achieving returns on investments. Figure 1 shows the S&P Global Energy Scenarios liquids demand up to 2050, highlighting the "Inflections" scenario with peak demand around 2029 followed by a gentle decline.

Figure 1. S&P Global Commodity Insights Scenarios, July 2024

Global oil (liquids) demand, 2010-50 (million b/d)



Global Geoscience Outlook for 2025: Setting the Stage for Years to Come

The energy industry is shifting in how it works, manages data, and makes operational decisions. Key themes for 2025 include emerging technologies, sustainability, decarbonization, evolving workforce skillsets, and global challenges in the geopolitical landscape. Opportunities will center around new job roles in Carbon Capture and Storage (CCS), Geothermal, and Digital Transformation within the E&P sector. Several factors will influence how this landscape evolves in 2025:

- The continued drive to harness the potential of data-driven decision-making, including the testing and scaling of autonomous systems already in development.
- Evolution of the geoscience workforce as the sector adapts to career development and skills evolution in order to create business advantage through technologies such as AI.
- Maximizing recovery through relentless focus on excellence in reservoir optimisation.
- Continued innovation in subsurface data (e.g. seismic) and technologies.

AI, automation, and digitalization are transforming the E&P industry. It is being tested and applied in many workflows, from strategic settings such as portfolio management through to technical applications such as predictive analytics, seismic interpretation, reservoir modeling, and production optimization. Over the next five years, AI-driven geoscience models will improve subsurface imaging, reduce

exploration risks, and enhance resource identification. AI-powered automation will optimize drilling parameters, and AI will play a crucial role in emissions monitoring and carbon capture initiatives.

Exploration drilling and resource discovery potentially hit record lows in 2024, and whilst an uptick is possible in 2025, there is a real risk that secure, diverse production at the required levels might be difficult by the late 2030s. This is a combination of stranded resources (transition regulation, cost, GHG intensity) and low discovery rates allied with reducing returns from established technical reserves replacement approaches such as enhanced oil recovery or infrastructure-led exploration. If the industry accepts that exploration is needed to add material reserves back into market then it might struggle to do so through highly mature basins, meaning that risks associated with finding new reserves increase. The jury is still out on the return of exploration, but it is becoming increasingly apparent that new strategies and approaches are needed.

This is a sector and workforce that continues to innovate and evolve commercially and technically against a backdrop of reduced budgets for exploration, increased regulation, a push to shorten times (e.g. the typical 8-10 years of an offshore cycle from licensing to production) against an uncertain monetization pathway and continued M&A activity. It's fine to ask or encourage geoscience to evolve faster but good leadership is needed to really enable this.

E&P Workforce of the Future: The Dilemma

The demand for hydrocarbons will continue, requiring skilled professionals to find and produce resources. The industry faces challenges in attracting new talent due to declining enrolments in petroleum engineering programs and societal pressure against working in the industry. Retaining existing staff, ensuring they are up to speed with new technology, and attracting bright new staff with new skills and capabilities are essential steps.

Where will these staff come from? There seems to be convergence in key areas

- Providing routes into industry without pure geoscience degrees.
- Recruiting from regions that have increased their geoscience academic offerings and working with those institutions to help them deliver the best courses possible.
- Building bigger teams local to resources where education can be supported and there are additional benefits such as meeting local content requirements.
- Understanding the demographics of teams a decade from now and maximising knowledge retention in E&P organisations through both technology and people before the opportunity is lost.

E&P Technology Innovation

Technological innovations have significantly impacted the E&P industry, focusing on enhancing efficiency and developing new capabilities. Recent improvements include seismic acquisition technologies, wellbore technologies, and reservoir technologies. Digital transformation has also led to advancements in exploration and production workflows, data retrieval and processing, and increased innovation cycles.

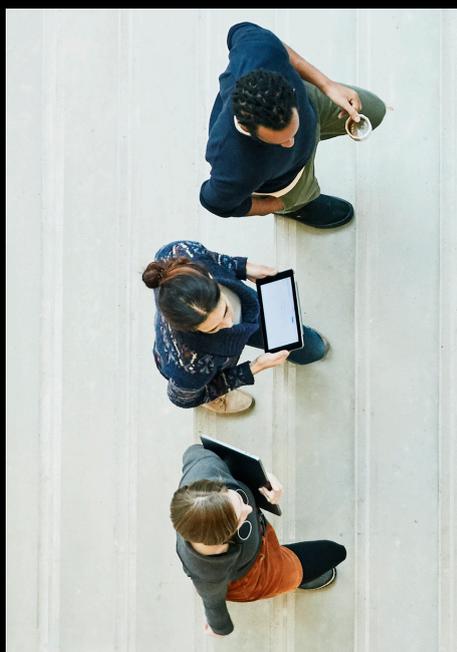
Energy Diversification for a Profitable Energy Transition

Energy companies are diversifying their portfolios beyond traditional oil and gas as part of broader energy transition strategies. This includes investments in CCS technology, renewable energy, and green hydrogen. The outlook for carbon sequestration projects is optimistic, with significant growth expected in regional hubs like the Gulf Coast, Permian Basin, and Midwest. These hubs are being scrutinised to see if they really work and can be replicated elsewhere in the world. Renewable energy investments are also robust, with North America, Europe, and Asia-Pacific leading the transition to a low-carbon energy system.

Summary

The E&P industry is at a pivotal moment, navigating the complexities of the energy transition while striving for operational efficiency and sustainability. This brief highlights the key trends, challenges, and strategic imperatives that will shape the future of energy. As we look ahead to 2025 and beyond, it is crucial for industry professionals to embrace innovation, digitalization, and collaboration to drive the evolution of E&P in a changing world.

Join us at the EAGE Annual event in Toulouse in June 2025 to explore these themes further and engage in discussions on the future of geoscience, technology, and energy. Together, we can foster dialogue, encourage innovation, and provide a forward-looking perspective on the industry's transformation.



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