SPE Review London



The official e-magazine of the SPE London branch

Behind the numbers: oil and gas majors in 2024

- C-Level Talk: Simon McDonald
- Women in Energy annual seminar Tickets!
- SPEi Board Nominees for 2027 President and 2026 Directors
- Introduction to upstream oil and gas in a net zero world – Tickets!
- The role of international oil companies in the netzero emission energy transition
- News, SPE events, local and international





SPE Review London

The official e-magazine of the Society of Petroleum Engineers' London branch

ABOUT US

The Society of Petroleum Engineers (SPE) is a not-forprofit professional association whose members are engaged in energy resources, development and production. SPE is a non-profit professional society with more than 156,000 members in 154 countries, who participate in 203 sections and 383 student chapters. SPE's membership includes 72,000 student members. SPE is a key resource for technical knowledge related to the oil and gas exploration and production industry and provides services through its global events, publications, training courses and online resources at www.spe.org. SPE London section publishes SPE Review London, an online newsletter, 10 times a year, which is digitally sent to its 3000+ members. If you have read this issue and would like to join the SPE and receive your own copy of SPE Review London, as well as many other benefits - or you know a friend or colleague who would like to join - please visit www.spe.org for an application form.

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ADMINISTRATIVE

Behind the Scenes: SPE Review Editorial Board



Elizaveta Poliakova, Editor in Chief

Elizaveta is a Reservoir Engineer at Trident Energy. She has an M.Sc in Petroleum Engineering from Imperial College London and a B.Sc. in Petroleum Engineering from the University of Leeds. Elizaveta has been with SPE for more than nine years. She was the President of SPE Imperial College Chapter and the President of SPE Leeds Chapter. She was the SPE London Board Chair in 2022/23.



Ffion Llwyd-Jones

Ffion is a business editor and writer, with a BA Honours in Environmental Studies / Language, and a Business/Corporate Communications degree from York University in Toronto, Canada. She is also edX certified for ChatGPT. Ffion has extensive writing and editing experience in the technology, health, automotive and environmental sectors.

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Letter from the Chair



Dear SPE London members and colleagues,

As we move into summer, I'm delighted to share updates and our upcoming initiatives.

First, I want to thank everyone who joined us at the recent **Newcomers' Social**. It was fantastic to welcome so many professionals new to London's energy community, and I'm pleased that the evening was filled

with enthusiastic conversations and new connections. Feedback was very positive, with attendees meeting colleagues from all parts of the upstream industry.

Looking ahead, our **Women in Energy full-day seminar on 19 June 2025** promises to be one of the highlights of the year. Held at London South Bank University, this seminar brings together leading voices. Workshops will cover negotiation skills, mentoring, and board potential offering practical tools for career advancement and building networks. I encourage all members, especially those committed to gender balance in our industry, to register soon. **Tickets are via this Eventbrite link.**

Ticket sales are also open for our annual Introduction to **Upstream Oil and Gas for the Net Zero World seminar, on 4 November 2025** at the Geological Society. This full-day program is for anyone who would benefit from understanding the key technical elements in oil and gas projects. With sessions covering all upstream disciplines, participants will leave with an understanding of our upstream industry, and its future. **Tickets are via this EventBrite link.**

Congratulations to **Simon McDonald on reaching 50 years of SPE membership**! Thanks to him and Sproule ERCE for their continued support.

As we plan the 2025-26 calendar, we seek **new volunteers for our committees**. These roles offer a direct way to influence SPE London's direction, network with industry leaders, and gain leadership experience. If you are interested, or if you have ideas to share, please reach out via email at SPELondon@spe-london.org

As your Chair, I aim for SPE London to remain a community where different perspectives meet to discuss the challenges of energy security, affordability, and sustainability. I look forward to seeing many of you at upcoming events.

I'll end on a light-hearted note:

- **Q:** What's the difference between an IPR and an IPA?
- A: If there's turbulence, an IPR goes vertical, but an IPA goes flat!

Best regards,

Adam Borushek SPE London Section Chair for 2024-25

ADMINISTRATIVE: Letter from the Editor

Letter from the Editor



Dear SPE London members,

Welcome to the third edition of SPE Review London in 2025!

In this issue, we are pleased to feature a special C-Level Talk with Simon McDonald, who recently celebrated 50 years of continuous SPE membership. His story offers a compelling look at the technical, strategic, and personal growth that many of us aspire to in our careers. Congratulations, Simon!

We also spotlight two of our most anticipated events:

- (1) The Women in Energy full-day seminar on 19 June at London South Bank University;
- (2) The Introduction to Upstream Oil and Gas in a Net Zero World course on 4 November at the Geological Society.

Alongside these highlights, the edition includes an outlook on the financial and operational performance of major oil and gas companies in 2024, as well as a timely discussion on the role of ilnternational oil and gas companies in the net-zero transition.

From market dynamics to evolving technical standards, we aim to keep our readers informed, connected, and engaged.

As always, this publication reflects the dedication of many volunteers across the SPE London community. Thank you to everyone who contributed articles and helped shape this issue – and a special thanks to our Editor, Ffion Llwyd-Jones.

We hope you enjoy this edition, and we look forward to seeing you at our upcoming events.

Warm regards,

Elizaveta Poliakova Editor in Chief, SPE Review London







NEWS

NEWS DIGEST... NEWS DIGEST... NEWS DIGEST



First price reduction in more than a year

BR PETROBRAS

Oil company Petrobras will reduce gasoline

prices in early June, according to a company statement.

Gasoline prices will go down by 5.6 per cent to an average 2.85 reais (\$0.5005)/litre, a 0.17 reais cut per litre.

ANP data shows a 6.4 per cent rise in gasoline sales by distributors in Brazil in April, from a year earlier, reaching 3.81 billion litres.

Gasoline sales totalled 14.74 billion litres in the year-to-date through April, an increase of 3.5 per cent compared to the same period in 2024. Read more

Baker Hughes sells stake in Cactus



Focusing on its core business, Baker Hughes will

retain a 35 per cent stake in a joint venture formed after the company sells 65 per cent of its surface pressure control business to a unit of equipment maker Cactus. The sale is worth \$344.5 million.

The Cactus SPC unit designs, manufactures and services specialized wellheads and production tree equipment for international markets. Read more

New non-executive director joins bp board



David Hager will take up the role as as a nonexecutive director from 2 June 2025. He has more than 40 years' experience in the oil and gas industry, most recently (2016– 2023) as executive chairman of the Devon

Energy Corporation, a US independent oil and natural gas producer.

Helge Lund, bp chairperson, who is expected to step down from the role in 2026, said of Hagger: "He brings deep-rooted knowledge of the US upstream oil and gas industry. His strategic focus combined with his experience in driving operational results and capital efficiency will be an asset to the board."

Read more

New partnership for SLB and ADNOC

ADNOC has signed an agreement to acquire a 70 per cent stake in SLB's land drilling rigs business in Kuwait and Oman.

Abdulrahman Abdulla Al Seiari, ADNOC Drilling CEO, said: "This acquisition is a natural next step in ADNOC Drilling's growth journey and reinforces our position as one of the leading companies in drilling and integrated services". Read more

NEWS DIGEST... NEWS DIGEST... NEWS DIGEST



Maria Phase successful production



Credit: Harbour Energy

The first of four wells in Harbour Energy's Maria Phase 2 project in Norway has started oil production. The development involves a fourwell subsea tie-back to existing infrastructure at the Maria field in the Norwegian Sea.

It marks the first of the next wave of subsea developments that the company plans to bring on-stream to support production from its Norway business.

Read more



Oil (Brent) 64.81 (+0.18) (-0.27%) 03.06.2025 (Credit: Markets Insider)

Wildfires threaten infrastructures

More than half of Alberta's oil production is offline as wildfires flames threaten critical infrastructure zones.



Operation at seven key oil producers in the Canadian province have been halted or scaled back, including evacuations in Fort McMurray. Read more

New CEO at Jadestone

Thomas Mitchell (Mitch) Little is the new chief executive officer at Jadestone Energy, an independent upstream production and development company

focused on the Asia-Pacific region.

His more than 30 years' experience in the upstream oil and gas industry includes technical, supervisory, and senior management positions. Read more



Fifty years of SPE membership - and still counting!



A reservoir engineer by background with a strong 'hands-on' approach, **Simon McDonald**'s experience and expertise encompasses all aspects of reservoir evaluation and field development planning and management, anchored by a good understanding of geoscience issues and a strong commercial perspective. He started his career with several overseas assignments with Shell International, before moving into consulting in the UK, with a time as an engineering manager with an oil and gas company with assets in the Arabian Gulf and North Africa. Simon was a founder of ERC Equipoise and is currently Principal Strategic Adviser for Sproule ERCE. At the beginning of 2025, Simon was recognised as a member of the SPE Legion of Honour with 50 years' continuous membership.

Who is Simon McDonald? Please tell us about yourself and walk us through your career

I was born in Liverpool and grew up on The Wirral, where I developed a lifelong interest in sailing as a member of West Kirby Sailing Club.

I studied Civil Engineering at Leeds University in the early 1970s, when the offshore oil and gas industry was taking off; all the UK engineering magazines and periodicals were reporting extensively on the investments being made in platforms and pipelines for the likes of Brent, Forties, Ninian and other large new fields and discoveries.

In my second year, I took an introductory course in Petroleum Engineering, and it was then that I joined the SPE, which had a membership at the time of around 20,000, 90% of whom were US based. The SPE has since grown into a truly international organisation, with some 70% of its professional membership¹ now based outside the US.

During my final year exams, I pivoted away from Civil Engineering to study for an M.Sc. in Petroleum Engineering at Imperial College London, where David Wilson was the Reader in Petroleum Engineering. David became a lifelong colleague, mentor and friend and, until this year, was Chairman of ERCE.

After graduating from Imperial, I joined Shell International as a Reservoir Engineer and spent nine years abroad with my wife Sarah: first in The Hague, then Doha, Qatar and finally Assen, North Holland. I was fortunate to have great mentors in Shell, and to be involved in several world-class projects, including leading the development plan for 16 sour gas fields to a new desulphurisation plant in East Holland, and participating in the appraisal drilling of the giant North Field in Qatar (which continued to expand in size with each additional well and is now the source of gas for Qatar's LNG exports around the world).

I authored the reserves report for the North Field in 1981, presenting a fourfold increase in gas reserves to 300 trillion cubic feet (more recent estimates after completion of appraisal reportedly show the reserves to have grown to over 900 trillion cubic feet, making the North field the largest nonassociated gas field in the world).

Sarah and I look back fondly on our time with Shell. The first two of our three children were born while we were overseas. We travelled widely, made an extensive network of friends (many of whom we are still in touch with) and I enjoyed playing rugby in Holland, and sand yachting, wind surfing and dinghy racing in Qatar.

We returned to the UK in 1985, when I joined the petroleum consultancy firm ERC as Principal Reservoir Engineer, where David Wilson was the Technical Director. These were exciting and challenging times, working in a much smaller company without the backup resources of a global multi-national. Unusually, all the reservoirs I had worked on with Shell had been carbonate, while most of the reservoirs in the North Sea and elsewhere are sandstone, so I had to learn quickly 'on the job'.

ERC grew rapidly and became a leader in the reporting of reserves and resources on the back of its selection for providing independent Petroleum Engineer's Reports (now known as Competent Person's Reports), included in the privatisation prospectuses for Britoil, Enterprise Oil and British Gas, and some high-profile takeover transactions (including Britoil by BP, and Ultramar by Lasmo). There were no internationally recognised standards

¹ Excluding students. The professional membership of the SPE in 2024 totaled some 70,000.

Fifty years of SPE membership - and still counting!... continued

for the reporting of offshore reserves and resources at the time (the SPE-sponsored PRMS was not introduced until 2007²) and so we came up with our own.

I was Managing Director of ERC at the time it came under the ownership of Petroleum Geo Services (PGS) in the mid-1990s. Shortly after, PGS and David Wilson set up Atlantis, an oil and gas company with assets in the Middle East and Tunisia, and I joined as Engineering Director. I was responsible for the engineering aspects of the development of two low permeability gas fields offshore the UAE, as well as Atlantis' non-operated interests offshore Tunisia, including development of a marginal oilfield producing to an FPSO.

With the sale of Atlantis by PGS in 2003, David and I resumed trading as consultants under the ERC name. I operated out of a summerhouse (known as "the shed") in my garden. We quickly re-established ourselves in the world of international reserves and resources reporting, acquiring several marquee

clients. All the geoscience input to our work was subcontracted under a joint venture agreement with Equipoise, whose principals we had worked with on the privatisations in the 1980s, and we used an extensive network of consulting engineers with whom we had built relationships over many years. The business logic for merging the two companies became overwhelming as we grew, and so ERC Equipoise (ERCE) came into being in 2010, with me as Engineering Director.

The past 15 years have seen many changes as ERCE has grown and evolved. We operate in most of the major petroleum producing areas of Europe, Africa, the Middle East, Asia and Australia, and have offices in Kuala Lumpur, Perth and Calgary. Building on the core skills of our traditional oil and gas focussed reservoir evaluation consulting and expert services business, ERCE now provides many evolving clean energy technologies, including carbon capture and storage, geothermal, hydrogen, lithium, helium and wind energy.

² The Petroleum Resource Management System (PRMS) provides definitions and a related classification system used internationally to support project and portfolio management requirements. PRMS is referenced for national reporting and regulatory disclosure in many jurisdictions. PRMS was updated in 2018. Reference.



Fifty years of SPE membership - and still counting!... continued

In March 2025, ERCE joined with Sproule, a Canadian headquartered petroleum consultancy with offices in Holland and Mexico, in a strategic merger that offers more opportunities for our clients and employees as our new company, Sproule-ERCE, extends its reach around the world. I can hardly believe that I have been a continuous member of SPE for 50 years; the time has passed so quickly. I have been fortunate that my career has coincided with the rapid growth of the industry, and the introduction of new technologies for evaluating and cost effectively developing oil and gas fields. I am lucky to have been guided by some excellent engineers in my early years, and to have had the opportunity to assess and evaluate hundreds of fields and discoveries in most of the oil and gas basins in the world. I have met and worked with many experts in their fields, and worked with some outstanding teams, including colleagues with many diverse backgrounds and experiences.

Why did you become involved with the Society of Petroleum Evaluation Engineers (SPEE)?

In North America, it has long been the case that to be an oil and gas evaluation practitioner one must be licenced to practice by the state. There is a strict process to secure a licence, including a degree in engineering, passing an examination and several years' experience, with an ongoing commitment to 16 hours per annum of formal continuous professional development. The opportunities to become professionally recognised as a practicing professional petroleum engineer outside of North America were until recently very limited.

Over 15 years ago, in response to international regulators taking a greater interest in the reporting of reserves in the public domain and looking to impose a more formal recognition process for competence to report publicly, a group of likeminded evaluation engineers started holding informal meetings in London to discuss reserves evaluation matters. We called ourselves The London Dining Club! I don't know why, as we never dined, but we did occasionally imbibe after our gettogethers.

We approached the Society of Petroleum Evaluation Engineers (SPEE), based in Houston, and enquired whether we could become affiliated. The SPEE is a self-regulating professional organisation focussed on the specialised field of oil and gas reserves definitions, reserves evaluations and fair market value and, with the SPE, is one of the sponsoring organisations of PRMS. To qualify for SPEE membership, applicants must have a degree in engineering or geology, at least 10 years' experience in the evaluation of oil and gas properties, and the sponsorship of three members of good standing. SPEE membership, which has an enforceable code of conduct, meets all the requirements now expected by several regulatory authorities for the reporting of reserves and resources.

We received an enthusiastic response, as the SPEE Board was looking to extend its reach internationally, although first the members had to change the society's by-laws which at the time precluded any chapters outside of North America!

And so, in 2010, I was a founding member of the Europe Chapter of the SPEE, the first chapter established outside North America. The chapter holds quarterly meetings and hosts presentations and discussions on all matters to do with reserves and resources reporting. I served on the Executive Committee of the Europe Chapter and was then honoured to be elected by members to the main Board of SPEE and, subsequently, appointed to its Executive Committee. I organised the first annual conference outside North America in London in 2017 and was President of the Society in 2018.

My involvement with SPEE has been such a rewarding experience, broadening my horizons, deepening my understanding of reserves evaluation issues and leading to many new friendships.

As a Director and Principal of ERCE, how do you balance technical excellence with commercial growth in a consultancy business?

ERCE has always prided itself on the technical excellence of its personnel and reports; we like to believe this is one of the factors which differentiates us from our competitors. We take great pride in listening to and understanding our clients' requirements and tailoring our proposals and work programmes to deliver exactly what they need.

The petroleum consultancy business is highly competitive, with several long-established firms offering comparable services to ERCE. The business

Fifty years of SPE membership - and still counting!... continued

is also cyclical, both in the short run (workloads are typically higher around year-end during the annual reporting period for oil and gas companies and often softer during the summer months) and the long run (for example, periods of commodity price strength (2005-2014) or weakness (1986-2000)).

While the most important asset of a consultancy is its personnel, these are also the highest contributor to its cost base. It is therefore critical to be able to grow and service one's clients efficiently during peak periods at the same time as ensuring profitability in periods of lower activity. ERCE manages this cyclicity by setting staffing levels sufficient to service the "low activity" workload and employing independent consultants we have known and trusted over many years to service the peaks.

Looking back on your milestone of 50 consecutive years of membership with SPE, what are you most proud of in those years, and what would you have done differently?

At my advanced age, my competence in the use of today's advanced software for evaluating well tests, interpreting fluid properties and running reservoir simulators is almost non-existent. However, ERCE's technical staff still recognise the breadth and depth of my technical and commercial experience and often seek my advice as a sounding board to guide them in their work. It gives me great pleasure to continue to be useful.

There is quite a catalogue of field evaluations that I have got quantitatively 'wrong' during my career so it could be argued that, with the benefit of hindsight, I should have done these differently. However, PRMS requires disclosure of reserves at Proved (1P, or P90), Proved plus Probable (2P, or P50) and Proved plus Probable plus Possible (3P, or P10) levels of confidence; so, if I am doing my job right, over the length of my career statistically 10 per cent of my estimates should be not low enough (the usual measure of 'wrong', especially by bankers) and 10 per cent should be not high enough!

What advice would you give young professionals in the oil and gas sector?

I believe it is just as important for young professionals in the early stages of their career to recognise not only their strengths but also their weaknesses, and to use this to guide their choices along the way. I realised at an early stage that my skills and interests were more suited to technical work than management, which lead me away from the excellent grounding I received from Shell and in the direction of consulting.

It is so important to keep learning, to stay curious, and to keep abreast of the latest techniques, particularly as the world transitions away from oil and gas to clean energy sources in the coming decades.

What next for Simon McDonald?

I am now working part time, which allows me to spend more time with Sarah and our family (including our four grandchildren) and to enjoy my hobbies and interests: golf, sailing, history, travelling, current affairs and spending time in our holiday home in Cornwall.

My role is now focussed on mentoring the excellent younger engineers in Sproule-ERCE and assisting the management with client interaction and company representation. I enjoy this hugely and have no plans to retire, for so long as Sproule-ERCE will have me!



The Next Generation: Solutions. People. Energy.



Get ready for a day filled with innovative solutions, inspiring people, and positive energy!

Join us for the **annual SPE Women in Energy Seminar** and experience a day that will leave you feeling inspired, supported, more connected and ready to take on your personal and professional challenges with fresh energy and new perspectives! Our action-packed programme features an impressive lineup of industry leaders, thought-provoking discussions, and invaluable workshops designed to empower and inspire professionals at all stages of their careers.

From keynote speeches by Amy Miller, CEO of Pragma, and Catherine Allsop, VP Subsurface at Equinor, to an engaging fireside chat with Nicola Adams, VP Corporate Strategy & Policy at bp and an interactive panel on mentorship, this event offers unparalleled insights into the latest trends and challenges facing the industry.

With a diverse range of workshops covering essential topics such as negotiation skills, menopause awareness, and board potential, attendees will gain practical knowledge and tools to enhance their professional development.

Don't miss this opportunity to network with peers, learn from experts, and be part of one of the top events of the year, complete with networking breaks, lunch, and evening drinks to foster meaningful connections.

WHEN:Thursday, 19 June 2025WHERE:London South Bank University

Organised by SPE London Women in Energy

Get your tickets via this EventBrite link

Full-time students are entitled to a **50% discount.** SPE members are entitled to **£15 off a £35 ticket with discount code: SPEMEM15**

SPE Women in Energy (WiE) is an SPE London Board subcommittee, run by volunteers, with the aim to promoting gender balance in the energy sector.



Behind the numbers: Oil and gas majors in 2024

Six oil and gas major companies account for a substantial share of global hydrocarbon supply. Their activities span exploration, production, refining, and logistics, and their investment decisions influence both market structure and capital allocation across the energy sector. Our SPE Review London editor, Elizaveta Poliakova, considers the financial and operational performance of six of the largest firms in the industry.

In this article, we look at the 2024 financial and operational performance of six of the largest firms in the industry: Saudi Aramco, ExxonMobil, Shell, Chevron, Petrobras, and TotalEnergies. Based on their latest disclosed data, these companies collectively produced approximately 28 million barrels of oil equivalent per day (boe/d) in 2024, representing roughly 16 to 17 per cent of estimated global production (IEA 2024).

Saudi Aramco



- Founded: 1933 as the California-Arabian Standard Oil Company by Standard Oil of California (now Chevron)
- Headquarters: Dhahran, Saudi Arabia
- Current CEO: Amin H. Nasser (since 2015)

Saudi Aramco reported full-year revenue of \$436.6 billion in 2024, a slight decline from the previous year¹. Average hydrocarbon production stood at 12.4 million boe/d, reflecting a reduction from 12.8 million boe/d in 2023 (Annual Report 2024). Average upstream lifting costs were at 3.53 \$/boe, while upstream capital expenditures averaged at 8.3 \$/boe with major investment in upstream development and gas expansion, including the Jafurah field.

"This competitive advantage is a result of the Company's robust fiscal discipline, its low depletion rate operational model, the unique nature of the Kingdom's geological formations, favorable onshore and shallow water offshore environments in which Aramco's reservoirs are located, synergies available from Aramco's use of its large infrastructure and logistics networks, and its scaled application of technology."

Aramco maintained its focus on low-cost resource development, capacity expansion, and long-term integration of its upstream and downstream assets.

¹Source: Saudi Aramco Annual Report (pdf)

ExxonMobil

Ex∕onMobil	
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- Founded: 1999 through the merger of Exxon and Mobil; Exxon traces its roots to Standard Oil founded by John D. Rockefeller in 1870
- Headquarters: Irving, Texas, USA
 - Current CEO: Darren W. Woods (since 2017)

ExxonMobil generated \$349.6 billion in revenue in 2024². Production rose to 4.3 million boe/d supported by expanded activity in the Permian Basin and Guyana (2024 Financial Statements). Capital and exploration expenditures totaled \$27.6 billion.

The company completed acquisitions of Pioneer Natural Resources and Denbury Inc., increasing both shale oil output and carbon capture infrastructure.

² Source: ExxonMobil 2024 Results

Shell plc



- Founded: 1907 through the merger of Royal Dutch Petroleum Company and The 'Shell' Transport and Trading Company
- Headquarters: London, England, UK
- Current CEO: Wael Sawan (since January 2023)

Shell reported revenue of \$289.0 billion in 2024³. Average production reached 2.836 million boe/d, up from

Behind the numbers... continued

the previous year. Capital expenditure was reduced to \$21.1 billion, in line with Shell's objective to prioritize high-return investments and enhance capital efficiency.

The company maintained investment in LNG while restructuring its upstream portfolio and returning capital to shareholders.

³ Source: Shell Annual Report and Accounts (pdf)

Chevron Corporation



- Founded: 1879 as the Pacific Coast Oil Co.
- Headquarters: Houston, Texas, USA
 - Current CEO: Michael K. Wirth (since May 2018)

Chevron posted \$202.8 billion in total revenue in 2024⁴. Production climbed to a record 3.3 million boe/d, driven by growth in the Permian Basin and new start-ups in the Gulf of Mexico (2024 Annual Report). Capital expenditures totaled \$16.4 billion, with an additional \$2.4 billion spent by affiliates.

The company advanced the Anchor and Tengiz projects and progressed the integration of Hess Corporation, _______ further consolidating its deepwater portfolio.

⁴ Source: Chevron 2024 Annual Report

Petrobras

- Founded: 1953 by the Brazilian government under President Getúlio Vargas
- Headquarters: Rio de Janeiro, Brazil
- Current CEO: Magda Chambriard (since May 2024)

Petrobras reported R\$490.8 billion in revenue (≈\$86.6 billion) for 2024 (PBR Management Report 2024)⁵. Production remained stable at 2.7 million boe/d, with crude oil output around 2.2 million b/d. The company achieved record pre-salt output and ran its domestic refineries at 93% utilization, the highest rate in a decade.

Capital investment totaled around \$16 billion, with major contributions from two new FPSOs delivered ahead of schedule.

⁵ Source: Petrobras Management Report 2024

TotalEnergies



- Founded: 1924 as Compagnie Française des Pétroles (CFP) by the French government
- Headquarters: Courbevoie, France
- Current CEO: Patrick Pouyanné (since 2014)

TotalEnergies recorded \$195.6 billion in revenue in 2024 (2024 Universal Registration Document). Production reached 2.4 million boe/d, with increases from new developments in Brazil, Argentina, and the U.S. Gulf of Mexico (2024 Universal Registration Document).

Capital expenditures were \$17.8 billion, with roughly a quarter allocated to low-carbon energies, mainly electricity.

⁶ Source: Total Energies URD 2024 including Annual Financial Report (pdf)

All figures are based on full-year 2024 data from each company's official investor reports.

Introduction to upstream oil and gas in a net zero world (November 2025)

Join us for a comprehensive one-day seminar designed to provide a clear introduction to the entire oil and gas lifecycle – the event that SPE London has run for 17 years. Whether you're new to the industry or looking to broaden your technical understanding, this seminar covers all the key elements, including exploration, production, geoscience, drilling, reservoir engineering and commercial terms. This year's event brings a fresh focus on the Energy Trilemma – the complex balance between energy security, affordability and sustainability – a particularly pressing issue for the UK, with no easy

Why You Should Attend:

solutions in sight.

- Gain insights into the full E&P cycle, from exploration to production.
- Learn about the Energy Trilemma and its relevance to the UK's energy landscape: balancing security, sustainability, and affordability.
- Introduction to M&A and deal-making in the industry.
- Understand Net Zero initiatives, including geothermal energy, carbon capture and storage (CCUS), and CO2 reporting.
- Network with industry experts and professionals from a wide range of career paths.
- Presentations are aimed at non-technical professionals—no prior experience needed.

This seminar is perfect for professionals working in or with the oil and gas industry, including those in finance, legal, IT, recruitment, and logistics. It is especially valuable for those new to the industry or looking to enhance their understanding of the technical and commercial processes involved in oil and gas projects.

Agenda

- 09:00 09:10: Introduction
- 09:10 09:50: The Role of E&P in the Energy Trilemma
- 09:50 10:30: Geosciences
- 10:30 10:50: Morning Break
- 10:50 11:30: Drilling
- 11:30 12:10: Reservoir Engineering
- 12:10 13:00: Lunch
- 13:00 13:40: Production Facilities
- 13:40 14:20: Upstream Economics
- 14:20 15:00: Upstream Digital Transformation
- 15:00 15:20: Afternoon Break
- 15:20 16:00: Sustainability and Reporting
- 16:00 16:40: Energy Transition Career
- From 16:40: Networking drinks

Secure your spot now (£199 before September 1, then £249) and join us to gain a full overview of the upstream oil and gas industry, hear from industry experts, and network with a diverse group of professionals.

WHEN:	Tuesday, 4 Nov 2025
WHERE:	The Geological Society, Burlington House, Piccadilly, London W1J OBD
TIME:	09:00 - 17:00 GMT

Get your tickets now!

SPEi Board Announces Nominees for 2027 President and 2026 Directors

C. Susan Howes is the nominee for 2027 SPE President. She and four others make up the new slate of nominees recommended for positions open on the SPE International Board of Directors.

2027 SPE President



C. Susan Howes is the president of Subsurface Consultants & Associates LLC, where she leads the firm's consulting, recruitment, and training services with a commitment to technical excellence. She brings extensive leadership experience from her tenure at Anadarko and Chevron, where she held roles of increasing responsibility in reservoir engineering, business development, human resources, organizational capability, and reservoir management.

A dedicated member of SPE since receiving an SPE scholarship in high school, Howes has made significant contributions to the organization. She has served in key leadership positions, including chair of the SPE Gulf Coast Section (2004–2005), Gulf Coast North America Regional Director on the SPE International Board of Directors

(2006–2009), Distinguished Lecturer (2019–2020), founding chair of the Management Technical Section (2022–2023), and chair of the 2024 SPE Annual Technical Conference and Exhibition Program Committee. Her outstanding service has been recognized with numerous honors, including the 1997 SPE Young Member Outstanding Service Award, 2003 SPE International Distinguished Service Award, 2016 SPE DeGolyer Distinguished Service Medal, and the 2018 SPE Honorary Member Award.

Beyond her industry contributions, Howes is actively involved in academia, serving on advisory boards for petroleum engineering programs at Montana Tech, Colorado School of Mines, and the University of Texas (UT), where she is also a member of the Geology Foundation Advisory Council.

She holds a BS in petroleum engineering (cum laude) from UT and was named a 2024 Distinguished Alumna of the Hildebrand Department of Petroleum and Geosystems Engineering at UT.

2026 SPE Directors



Sarah Kern is the principal industry affairs specialist at Helmerich & Payne (H&P), where she leverages her technical expertise and marketing acumen to drive impactful storytelling and foster innovation. Over her 15-year career with H&P, she has held diverse roles spanning engineering, operations, communications, market intelligence and analytics, and marketing, working in both Houston and Tulsa. Deeply committed to advancing the energy industry, Kern serves as program chair for 2025 SPE Annual Technical Conference and Exhibition and has been an active member

2025 SPE Annual Technical Conference and Exhibition and has been an active member of the SPE/IADC International Drilling Conference and Exhibition Program Committee for many years, including as Diversity & Inclusion Program Chair. Additionally, she has contributed to the advisory committees of the two most recent SPE Drilling Technical

Directors. She has coauthored 17 technical papers, 16 of which were published by SPE. She holds a BSc in electrical engineering and marketing from Oklahoma State University.



Linda A. Battalora is a teaching professor in the petroleum engineering department at the Colorado School of Mines (Mines). She is a Ben L. Fryrear Chair for Innovation and Excellence, Payne Institute for Public Policy Faculty Fellow, and Shultz Humanitarian Engineering Fellow. Prior to joining the faculty at Mines, she served in various roles in the oil and gas industry including petroleum engineer, attorney and international negotiator for oil and gas project development.

Battalora is chair of the SPE Methane Emissions Management Technical Section and a member of the Health, Safety, Environment (HSE), and Sustainability Advisory

SPEi Board announces nominees... continued

Committee. She is a past chair of the Sustainable Development Technical Section and the SPE Diversity & Inclusion Standing Committee. She is an SPE Distinguished Member and an SPE Distinguished Lecturer (2019–2020). In 2024, she received the SPE International Award for Sustainability and Stewardship in the Oil and Gas Industry. She is the Mines Director of TOP Energy Training's flagship program, TOPCORP. Her research areas include sustainability, HSE and methane emissions management.

She holds BS and MS degrees in petroleum engineering and a PhD in environmental science and engineering from Mines, and a law degree from Loyola University New Orleans College of Law.



Greg Stephenson is the chief production engineer at Occidental Petroleum (Oxy), with functional responsibility for the production engineering discipline. In this role, he leads a team of artificial lift subject matter experts and sponsors the Oxy Engineering Development Program for recent engineering graduates.

With 29 years of experience, Stephenson is an industry-recognized specialist in artificial lift who has taught numerous courses around the world and a published author of a variety of technical publications on the subject.

He began his SPE journey as a freshman at Texas Tech University in 1990. Since then, he has served SPE in several roles, ranging from author to peer reviewer to

conference chair. He recently completed two terms as technical reviewer for artificial lift on the JPT Editorial Review Board and previously served as associate editor for the Production and Operations journal. Stephenson also serves on the Board of Directors of the Artificial Lift Research and Development Council and is the immediate past chair of API Task Group 19G, managing 25 product standards, recommended practices, and technical reports related to artificial lift technology. He also serves on advisory boards for the Texas Tech Department of Petroleum Engineering, Texas Tech Gas Lift Consortium, Tulsa University Horizontal Wells Artificial Lift Projects and the Louisiana State University Valve Performance Clearinghouse. He holds a BS in petroleum engineering from Texas Tech University.



Neil Boyer is the director of business development at NexTier (Patterson UTI), where he is responsible for the strategic planning and execution of the northeast sales program. With over 15 years of experience under the Patterson UTI umbrella, he has held various key roles, including director of sales, sales engineer, district engineer and field engineer.

Boyer has been an active member of SPE since his freshman year at Marietta College, and with the Pittsburgh Section for more than 11 years where he has served in numerous leadership positions, including chairperson, vice chair, student liaison and program chair. He has also contributed to the planning committee for the SPE Eastern

Regional Meeting for more than five years, serving as chairperson in 2018 and

co-chairperson in 2021. He holds a BS in petroleum engineering from Marietta College.



Maged Mabrook Y. is the vice president of enhanced oil recovery and CO_2 sequestration at ADNOC HQ.

He has been involved with SPE for over 20 years, recently serving as chairperson for the SPE Abu Dhabi Section and member of SPE Middle East and North Africa Board of Directors for 2023–2025. He serves on several SPE regional and international technical and executive committees, and received the 2020 SPE Middle East and North Africa Regional Service Award.

He holds an MSc in petroleum engineering from Khalifa University. He is a Chartered Petroleum Engineer with the Energy Institute, a Certified Project Management

Professional (PMP), and has passed CFA Level 1 from the CFA Institute.

SPEi Board announces nominees... continued

How SPE Board members are selected

SPE is governed by a board of directors comprising 20 member representatives from around the world, including three officers and 17 representatives of geographic regions and technical disciplines. Officers and directors are elected to a 3-year term, with approximately one-third of the board rolling off each year. Officers and directors include representatives of both geographic and technical constituencies, and three presidents (current, past, and elect).

Nominating a candidate

The nomination period opened in October 2024 and ended in January 2025. Any SPE member may nominate a candidate for a position on the board. The process involves submitting an online nomination form and supporting documents such as a curriculum vitae, resume, and letters of support.

The election process

Candidate nominations submitted online are reviewed by the SPE Nominating Committee. Chaired by the immediate past president, the committee met in February to make recommendations for the available positions. These recommendations were submitted to the SPE International Board of Directors for approval at a meeting of the board held in mid-February.

Following Board approval of nominees

The Board of Directors reports the nominations in the Journal of Petroleum Technology (JPT). SPE members will have the opportunity to review the board-approved nominees' biographical information in the April issue of JPT and on www.spe.org.

Nominees approved by the board stand as elected unless SPE members nominate additional candidates by petition. The petition process must be completed no later than 45 days following the publication date (1 April) of the slate of Board of Directors' approved nominees in JPT.

Board of Directors' nominees for positions for whom no petition with the requisite number of signatures is received within 45 days following the publication date of the slate of nominees in JPT shall be deemed elected to such positions. Additional nominations require a petition from 1.0% of the voting members of SPE on petitions for president-elect, and 2.0%, or a minimum of 150 members, from the represented group for regional director and technical director positions. A ballot election will be held if any qualified petitions are received.

The Board takes office

If the board slate is elected, the person nominated as president would take office as president-elect at the close of the SPE Annual Technical Conference and Exhibition. This year, the conference will be held 20–22 October in Houston.



Role of international oil companies in the netzero emission energy transition (part 1 of 3)

Abstract

Scientific and engineering capabilities in hydrocarbon supply chains developed over decades in international oil and gas companies (IOCs) uniquely position these companies to drive rapid scale-up and transition to a net-zero emission economy. Flexible large-scale production of energy carriers such as hydrogen, ammonia, methanol, and other synthetic fuels produced with low- or zero-emission renewable power, nuclear energy, or hydrogen derived from natural gas with carbon capture and storage will enable long-distance transport and permanent storage options for clean energy. Use of energy carriers can overcome the inherent constraints of a fully electrified energy system by providing the energy and power densities, as well as transport and storage capacity, required to achieve energy supply and security in a net-zero emission economy, and over time allow optimization to the lowest cost for a consumer anywhere on the globe.

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Introduction

Over the last 100 years, international oil companies (IOCs) have played a crucial role in the global economy in supplying high–energy density fuel and petrochemical products, both of which are trillion-dollar industries that contribute to high standards of living for the developed world. Oil and natural gas currently supply 57 per cent of global energy ¹. Limiting global warming below 1.5°C requires major reductions in fossil CO₂ emissions and transition to a low-carbon energy system. Low-cost renewable wind and solar resources generate power at lower density, which can be transported as electricity, but only over shorter distances, and is more expensive to store. A common belief is that oil and gas companies, despite pivoting to low-carbon energy, may face such significant challenges to their business model that it is hard to see how they may become part of the solution. What, if any, future role do IOCs have in a net-zero emission energy system? Here, we show that IOCs have a crucial role in providing carriers for low-cost storage and transport of primary energy, which will create greater customer choice in resource and access options for a future energy system. Development of flexible, customer-driven supply chains is in fact the very core of an IOC's business model. IOCs can therefore use their acquired competencies to accelerate the transition to a net-zero emission energy system.

Energy transitions are not new—but they are rare and often slow to finish. Indeed, the Industrial Revolution, which started in 1750 in England, is by no means complete: 60% of the world's population is still living in pre–Industrial Revolution conditions². The reason is that energy transitions such as the Industrial Revolution scale poorly relative to the size of the population and, in many cases, not at all. An energy transition does not happen by itself but often is triggered by a technology opportunity, such as the use of coal to produce steam in boilers, and a demographic condition that a sizable segment of the population can make good use of these technologies and thereby lift living standards out of poverty. Where the enabling technology's ability to scale and grow revenue is large enough, a large fraction of the population can enter the middle class. This is the well-known mechanism by which the middle class grows³.

The conditions for success at societal scale are not always present and certainly are not just technical, but they start with a technological opportunity that is accessible (affordable) to an emerging middle class. To date, energy transitions have entailed a migration to higher-density energy resources (e.g., coal over wood), allowing production of heat and power for mechanical and chemical conversion processes that otherwise

would not be plausible or affordable. To achieve societal scale, significant infrastructure investment and development are indispensable, for which costs will be high. Hence, the following challenges must be addressed to realize a large-scale energy transition; together, these drivers form an energy policy triangle⁴ (*see Figure 1*):

 Economic: Develop, optimize, and adapt the value chains and finance infrastructure needed to deliver clean energy resources and services to consumers. This translates into establishing flexible low-cost supply chains ensuring affordable access to energy.
Security of access: Ensure societal or national-scale predictable access to resources and

functioning of energy services.

3. **Environmental impacts**: Ensure the local and global well-being of people and the environment relative to the emerging energy system footprint.

For the newly emerging net-zero emission energy transition, climate impacts become a global systemic constraint, superimposed on local issues of environment and energy security. Each society, country, or region continually decides the optimal trade-off among these three drivers. A high level of collaboration is required among policy makers and stakeholders representing the public, local communities, and industries who manage value chains that may extend beyond national borders.



Economic Development

Paths toward a net-zero future depend strongly on the level of economic and demographic development. In Asia, where up to three billion people will enter the middle class in the next three decades, the developing economies will prioritize economic growth. Traditional high-energy intensive process industries such as the manufacture of steel, cement, plastics, and ammonia will grow, because they are crucial for economic development and provide a co-benefit of higher wages.

Plants in these industry sectors often are powered by coal from national reserves, providing lowcost and secure supply. Reducing emissions from these industries poses a dilemma of ensuring economic growth while focusing more on clean energy resources. Rapid growth of renewable power with high-voltage direct current (DC) transmission has started in Asia, and with sometimes spectacular success⁵, but may not scale quickly enough globally to affordably meet the increased demand for energy caused by the upward demographic changes⁶.

The pace of electrification

Western societies around the northern Atlantic are prioritizing decarbonizing energy for power grids, residential heating and cooling, and personal mobility. Renewable power generation is growing rapidly but is bottlenecked by infrastructure to deploy this intermittent resource. Demand for electricity outpaces the speed at which renewable power can be brought on stream, such that abundant renewables are effectively a scarce resource from an end-user perspective, which is reflected in high electricity costs. Although this scarcity will only be temporary, the question is the extent to which it will pose a bottleneck to decarbonization of industrial processes in time to meet the Paris Climate Accords. Electrification of the energy system by renewable power will lead to an intermittent instantaneous supply, which is unacceptable for many end uses, particularly industry. Affordable energy storage is needed for industry adoption.

Land use and reform

The low power density of renewable wind and solar energy restricts deployment in populated areas where available land is scarce. Electrical energy transport to connect sources with markets is limited in range and also requires storage for grid resilience. The growth of the middle class in developing economies increases demand for land and water resources also needed for food production. Hence, decisions at a food, water, and energy nexus become inevitable in densely populated areas where land availability is scarce. The potential land use for renewable power generation near urbanized areas is substantial. For example, in 2011, the average annual energy consumption of a block in Manhattan⁷ was 1,000 kWh/m², giving a power density of 100 W/m². A typical wind farm today⁸ has a power density of only approximately 5 W/m², whereas an average US solar farm would provide 9 W/m^{2. 9–11}.

It is entirely feasible to power Manhattan via renewable energy provided by wind farms built offshore, where available space is less of an issue. However, very large wind farms would be required, and recent studies have shown that large mesoscale windfarms have much lower power densities (approaching 1 W/m^2) than smaller wind farms, which may exceed power densities of 10 W/m^2 due to much less atmospheric turbulence effects and more wind field recovery¹².

These large-scale efficiency effects on wind energy production will matter at length scales on the order of 1– 10 km, which is the projected scale at which wind farms need to be built to supply Manhattan via renewable energy. A recent study¹² on the effective production of large (20 GW) wind and solar farms in California showed that 50 per cent of installed capacity is used only 22 per cent of the time over a year, stressing the need for significant seasonal storage. These land use and storage challenges become more visible at large scale and imply the need for significant storage and transmission infrastructure.

Production of bio-based fuels and chemicals requires transport of low-density biomass to central facilities to obtain economics of scale, given the high capital intensity of the complex conversion process units. Land availability can thus impede the scale-up of low-density sources such as biomass¹³. Although inevitably the growth of renewable electricity is seen as crucial to halt global warming, a pressing question becomes how to accelerate a net-zero transition¹⁴ in the context of potential bottlenecks in infrastructure and land use for densely populated areas and developing economies. The core business model of an international oil company (IOC) in transport and storage of energy can be adapted to address this important dilemma.

The historical role of an IOC in global energy and (base) chemicals business

The rise of IOCs dates back more than 100 years, during which early local oil markets expanded globally. Oil and gas reserves are not distributed uniformly around the globe but depend on very specific geological conditions. This means that to grow energy markets, flexible supply chains must be developed to connect markets often far away from energy production. Oil or petroleum is a very good medium for both long-term storage and transport, which has allowed the development of a flexible supply-chain system that today

connects resources produced from anywhere on the globe to practically any consumer, irrespective of the distance between source and consumer. Thus, a very efficient, low-cost global supply chain has been developed through continuous innovation in production and transport technologies for oil¹⁵ and natural gas¹⁶, which together supply more than 50 per cent of current world energy. This high-energy density supply chain has allowed the energy system to grow by more than a factor of five in less than five decades. For the energy transition, rapid scale-up is again needed to achieve a globally effective net-zero emission energy system in time to halt global warming at 1.5°C. Key aspects of an IOC's current business model are discussed here.

Long-distance transport and storage

Oil is both a fuel and an 'energy carrier' (17) in a fluid state at room temperature with a very high volumetric energy density of 35–45 GJ (10 KWh)/m³, or 45 MJ/kg. It has approximately half the mass of coal but provides savings in transport and ease of use as a liquid energy carrier that can be pumped, stored, and transported at will on a 24-hour basis throughout the year. The invention of the bulk carrier or tanker ship provided a very flexible transport capability, which in turn enabled rapid scale-up of global supply. A modern super tanker contains 318,000 metric tonnes of oil (approximately two million barrels), representing approximately 3.74 TWh of storage. At US\$10 per barrel of oil equivalent (BOE) production cost (typical for 2022 Saudi Arabia) containing 1,700 kWh of energy equates to 0.26 cents per kWh of storage. This low storage cost is possible because of the high-capacity factor of the production process combined with the highpower density of production and the high energy density of hydrocarbon fuels, which can be stored as liquids at room temperature. Molecular or chemical energy carriers are Nature's choice to store and transport energy for most living animals. The world energy system is 100 million BOE per day, and approximately 800 of these super tankers are in operation at any time as the world's global transmission lines. In other words, the global fleet of tankers forms a formidable and predictable low-cost supply network that can be used effectively in arbitrage and energy trading around the globe. Furthermore, its flexibility assures that individual (local) upsets in production from a well or transport vessel have negligible impact on energy availability or cost to consumers.

High-power density processes with high-capacity factors

The high energy density of fossil hydrocarbons enabled the development of high-power density devices to unlock the energy in hydrocarbon bonds, enabling chemical processes requiring high-temperature thermal energy. These processes further led to the development of new and low-cost products (high-performance fuels and chemicals like plastics) that were affordable even for the lower and middle classes of society. Thus, one starts to appreciate that the middle classes (as, for example, in Europe coming out of WW2, with much of its infrastructure in ruins) saw much growth in living standards. To date, approximately 90 per cent of oil is produced from fewer than 40 super basins. Although there are many more oil fields, this super class has allowed the colocation and concentration of chemical and other industrial processing industries near these super basins (e.g., in the Middle East, the US Gulf of Mexico, and the North Sea in Europe). The efficiency of such industrial clustering allowed rapid and cost-effective infrastructure development, similar to the underlying reasons driving urbanization to enable fast scale-up of services to improve standards of living¹⁸. The clustering of high–power density industries for 24/7 continuous manufacturing is made possible by the availability of storable, high-density fuels.

Diversification of resource use

Although initially oil was used mostly in transport and heating (i.e. through combustion), an important development saw it being used for entirely new materials and products in the form of hydrocarbon molecules. Economics for the petrochemical industry is largely acyclic to oil production, creating a buffer in business models of an IOC against crude demand fluctuations. Petrochemical manufacturing has become a very large industry with a focus on large-volume base chemicals (ethylene, propylene), which may represent 10 per cent of an IOC's product flow but often a larger portion of product value. Transport fuel markets are

likely to shrink significantly in the future with the electrification of personal mobility, whereas chemicals production is expected to grow at rates in excess of global GDP as developing economies progress to achieve greater societal wealth and well-being¹⁹.

Given the availability of energy and resources oil and gas provide, a larger fraction of the global population has been able to lift out of poverty in just a few decades. This is a remarkable achievement in the history of energy transitions and is based on deep technical understanding of chemical properties of hydrocarbons and the physics of production and transport. A similar scale-up of clean and renewable energy technology is needed to achieve a net-zero emission transition at a global scale.

A future role of IOCS: A dilemma and an opportunity

The scale at which the energy system must operate to allow growth in developing markets such as Asia and Africa will require changes in energy production and transport and in modes of consumption. The required changes go far beyond scaling up of renewable resources.

As the world moves away from fossil fuels, state-owned national oil companies (NOCs) as resource owners will command a larger percentage of production, compared with independent IOCs, and can focus on the most efficient, lowest-cost, and lowest-carbon footprint oil and gas fields. Absent new discovery, oil and gas production declines 8 per cent yearly on the average. For an IOC, this is a conservative estimate, as its resource assets are more difficult to produce and require continued investment in advanced technology²⁰. High-capacity factors, or the percentage of time an energy resource is available annually, and low storage costs for oil and gas versus renewable wind and solar energy will continue to provide a strong value proposition for traditional hydrocarbons. Ultimately, demand for oil and gas will be decided by the degree of acceptance of carbon capture and storage (CCS) for mitigation of fossil energy use, society's desire to place a cost or price on CO2 emissions, and stakeholder preferences and plausibility for wind and solar variable renewable energy (VRE) versus other clean energy options (nuclear, hydroelectric).

Both NOCs and IOCs may shift portfolios toward renewable and low-carbon energy to supply stakeholder demand in global markets, potentially via forming separate fossil and low-carbon businesses or organizations. For NOCs in the Middle East, solar intensity and low-cost land may allow faster ramp-up of renewable power than in other regions like Europe and Asia. Business models in fossil energy supply and services are relevant for enabling scale-up of low-carbon energy supply and services. This is especially true for IOCs, which have been forced to develop deep capabilities in technology and engineering as well as supply-chain management to remain competitive, for a system where oil or natural gas is not only the energy source but also the high–energy density carrier that may be transported in bulk or stored.

Thus, for oil and liquified natural gas in the current energy system, the primary energy source (subsurface fossil hydrocarbon) is also the energy carrier used for transport to market. From this perspective, the biggest difference with a net-zero energy system is that this will no longer be the case. Primary energy sources such as solar photons must first be converted to electricity, which can then be transported via transmission lines. Direct use via electrification or storage in electrochemical cells (batteries) is more efficient than the conversion to molecular energy carriers or fuels. This contrasts with a fossil hydrocarbon-based energy system, in which electricity is produced via combustion of molecular energy carriers at lower efficiencies. However, major technological challenges to direct electrification, as well as to storage, impede the scale-up of an energy transition. For example, transmission over distances of more than 1,000 km is not very efficient, and therefore more expensive, and is not flexible compared to transport of chemical carriers such as oil. Note that the lower capacity factor of larger wind farms favours more, smaller windfarms distributed over larger areas, implying that distances to markets increase. Furthermore, and more importantly, electricity production via solar photovoltaic (PV) or wind turbines is instantaneous and intermittent, requiring effective and efficient

energy storage on daily or seasonal timescales for many customers. These factors constrain the speed at which the energy system can be scaled, especially for hard-to-abate industrial sectors requiring high power density. Over longer distances (>1,000 km) and time durations, and to obtain the higher energy and power densities needed to support industrial manufacturing or urbanized city centers, molecular or chemical carriers may be required.

A potential alternative to use of molecular or chemical energy carriers is production of excess electricity to deal with the variability associated with solar and wind resources, augmented by dispatchable nuclear, hydroelectric, geothermal, or biomass-derived power. Molecular or chemical energy carriers can be produced and used locally to store intermediate wind and solar power or produced in regions of higher wind and solar intensity and shipped the long distances needed to connect to regions lacking in advantaged renewable resource intensity. IOCs can thus move from being suppliers of fossil fuels to suppliers of molecular or chemical carriers needed for energy storage and transport. They can thus offer parallel routes to transition to a net-zero emission energy system beyond transmitting electricity and thereby enable and accelerate the transition.

As the energy policy triangle (*see Figure 1*) illustrates, the pace of systemic change will be driven not only by climate or environmental drivers but equally by national policies ensuring energy access and business opportunities as well as technology innovation. NOCs own the resource and mineral rights, are often the low-cost producer, and have a vested interest in and market advantage for continued production of fossil resources. Although the International Energy Agency^{21,22} expects world oil production to decrease 70 per cent by 2050, the NOCs' share of production will increase from 34 per cent to 52 per cent. This means that IOCs will divest away from fossil assets more quickly than NOCs, and hence will need to accelerate new, low-carbon businesses to ultimately become the main source of income in pursuing a transition to net zero. An important aspect to anticipate is the role of energy carriers (other than oil or gas) in connecting clean or renewable resources to a variety of energy consumers or markets that may be far away from the production of the primary energy resource (as is the case for oil and gas). Energy transport and storage, and supply chains of renewable and other clean energy resources. Decades of unique chemical engineering and technology developed in IOCs can be leveraged to enable new carriers for energy transport and storage.

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This article continues in our next issue: A Role of an IOC that Leverages Its Unique Capabilities and Strengths to Accelerate the Transition to Net Zero?

EVENTS

SPE events calendar – local and international

LOCAL – UK

Ongoing through 2025 (London, England) London SPE events

Energy on Draft!

Quarterly social evenings open to all experienced professionals and career starters within the energy industry. Come along to catch up with friends and make new connections over drinks!

Tech Talks

Monthly events on various topics of interest to industry professionals. Speakers include Distinguished Lecturers.

Net Zero webinars: Insights and more. More information: **SPE London**

September 2-5, 2025 (Aberdeen, Scotland) SPE Offshore Europe Conference & Exhibition

The transition to a sustainable energy future depends on our industry. SPE Offshore Europe helps the offshore energy value chain to accelerate the transition to a better energy future by uniting the power of expertise, knowledge and innovative technology to drive progress. OE is a platform for collaboration, progress and results, designed by the industry for the industry. We set our sights on the next frontier: mapping the journey to a sustainable, better energy future.

More information: SPE Offshore Europe

INTERNATIONAL

June 09–11, 2025 (Houston, Texas, USA) Unconventional Resources Technology Conference

The Unconventional Resources Technology Conference (URTeC) focuses on the latest science and technology applied to exploration and development of unconventional resources, with special emphasis on integration of the technical/ professional disciplines. The 2025 meeting is at the George R. Brown Convention Center, in Houston, Texas. Engage with professionals in all aspects of the unconventional E&P lifecycle. More information: SPE conference

August 26–27, 2025 (Kuala Lumpur, Malaysia) ASIA Pacific CCUS Conference and Exhibition

APCC 2025 will examine the integrated value chain of CCS/CCUS, considering emissions across various industries. Emphasis will be placed on upstream and downstream sectors, addressing challenges involved in developing capturing sites, establishing efficient transportation and pipeline infrastructure, designing hubs, and creating networks for the effective deployment of CCS/ CCUS. Fostering an enabling environment for CCS/ CCUS development. More information: **Conference**

June 10–12, 2025 (Vienna, Austria) SPE Europe Energy Conference and Exhibition

It is with great pleasure that we welcome you to the 2025 Europe Energy Conference in the city of Vienna! We are excited to host you in this magnificent city as we come together to explore and innovate for a responsible energy transition. Our conference theme, "Innovating Together: Solutions, People, and Energy for a Responsible Transition," underscores the critical importance of collaboration in addressing the energy challenges of our time.

More information: SPE conference

September 9–10, 2025 (Mexico City, Mexico) IADC/SPE Managed Pressue Drilling & Underbalanced Operations

Once considered a futuristic technology, DGD is now a reality with numerous wells drilled, and many exciting prospects on the horizon. New applications of these drilling practices take place every year, and their frequency continues to grow.This conference is a world recognized forum to help the energy industry better understand the technology and the effective, safe utilization of the various applications of UBD, MPD and DGD. More information: **Conference**

For a complete listing of all events on the SPE Global Events Calendar: spe.org/en/events/calendar/ And, for more information about SPE training courses, calls for papers, and opportunities for SPE London sponsorship: SPE London

Meet the SPE London Team

The Society of Petroleum Engineers (SPE) is a not-for-profit professional association whose more than 140,600 members in 144 countries are engaged in oil and gas exploration and production. The SPE London board oversees the SPE London activities including our evening programme and other events. Our different committees have specific focus, including Young Professionals, Women in Energy, Net Zero and associated student chapters. As well as engineers, we also welcome qualifications in geology, geophysics, earth science, environment, health and safety, mathematics, information technology, management and economics.



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SPE policy on AI-generated content in publications

SPE Policy on AI-Generated Content in Publications

The SPE Board has approved a new policy allowing AI-generated content to be used within SPE publications under specific conditions.

Al-assisted language tools (such as ChatGPT) have gained widespread attention recently, particularly for their capability to assist in drafting scientific papers. While these tools have the potential to enhance the efficiency and speed of academic and technical writing, the ethics and best practices for their use are still evolving. These tools may generate useful information and content but are also prone to errors and inconsistencies.

The SPE Board has approved a new policy for authors who use AI language tools to generate content for their papers. The policy states that AI-generated content may be used within SPE publications but under specific conditions.

• Al language tools may not be listed as an author. The Al tool cannot sign publishing agreements or transfers of copyright.

• Any AI-generated content that is used within a manuscript should be thoroughly vetted, fact checked, and disclosed.

• If AI language tools are used within a manuscript, their use should be clearly explained within the methodology or acknowledgment section of the paper. If AI-generated content is included within a manuscript without an explanation, this can be grounds for rejection of the work at the discretion of SPE and may result in a code of conduct review.

• The authors of the manuscript will be held responsible for any errors, inconsistencies, incorrect references, plagiarism, or misleading content included from the AI tool.

It is important to note that technology for AI language tools is advancing rapidly. SPE plans to periodically review and update this policy to ensure its relevance and effectiveness. Any modifications to the policy will be communicated transparently and in a timely manner.



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