CEO’S CORNER
Buffett Turns a Tidy Profit on Fossil Fuels Trades

EXPLORATION EXCELLENCE
Bravo as Pavo gets an A for Awesome

TECH TALK
Rollercoaster of PESA’s Annual Review
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PRESIDENT'S REPORT
Seismic in the Age of Sustainability & Blurring of Facts Blighting Activities in the Basins

EXPLORATION EXCELLENCE
Carnarvon’s Path to Paradise is Paved with Pavo Aspirations

HYDROGEN HOPES
South Australia Has Opened its Doors to Hydrogen Exploration

(continued on Page 3)

Deadline dates for editorial submissions for the FOURTH Quarter 2023 edition of PESA News
Technical articles: November 1  |  Branch News: November 14
Alternately: Email the editor at editorial@pesa.com.au to discuss

COVER PICTURE: The Noble Tom Prosser jack-up rig was deployed by Carnarvon Energy to the Bedout Sub-Basin where exploration drilling at Pavo confirmed Australia’s biggest oil discovery for 2022.

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INSPIRATIONAL IMAGES

CEO’S CORNER
# Conference Calendar

## September

- **5-8**: Gastech 2023  
  **Venue**: Singapore EXPO  
  **Website**: gastechevent.com

- **6-7**: RIU Good Oil & Gas Energy Conference  
  **Venue**: Hyatt Regency, Perth  
  **Website**: https://10times.com/oil-gas-investment-conference

- **13-15**: OGA  
  **Venue**: Kuala Lumpur Convention Centre  
  **Website**: oilandgas-asia.com

## October

- **2-5**: ADIPEC  
  **Venue**: Abu Dhabi, United Arab Emirates  
  **Website**: adipec.com

## November

- **21-22**: Australian Hydrogen Conference (West)  
  **Venue**: The Crown Perth, WA  
  **Website**: australianhydrogenconference.com.au

## May 2024

- **6-9**: Offshore Technology Conference  
  **Venue**: NRG Park, Houston, Texas  
  **Website**: 2024.otcnet.org

- **22-23**: CCUS (SPE, AAPG, SEG)  
  **Venue**: Rio de Janeiro  
  **Website**: latinamerica@aapg.org

## June 2024

- **17-19**: URTeC  
  **Venue**: George R. Brown Convention Centre, Houston, Texas  
  **Website**: TRBC

## November 2024

- **19-21**: OSEA 2024  
  **Venue**: Marina Bay Sands, Singapore  
  **Website**: https://ossea-asia.com

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For all membership related enquiries please contact membership@pesa.com.au and for all other enquiries, please contact info@pesa.com.au
IN an era marked by increasing environmental consciousness, the Australian energy sector is undergoing a significant transformation towards greener practices. Companies are investing in cutting-edge technologies that minimize environmental impact, reduce emissions, and optimise resource utilisation. From using advanced seismic imaging for precision exploration to employing carbon capture and storage techniques, the industry is aligning itself with global sustainability goals.

But the recent environmentalist backlash against Woodside’s CEO serves as a poignant example of the complex challenges that energy companies face in an era dominated by climate change concerns. We are told by the media that this “incident underscores the need for transparent communication, and collaboration among various stakeholders to drive positive change.”

But this communication is not in any way aided by the mainstream media who seem determined to undermine our industry, and whose reporting styles cannot be considered unbiased. Recently, with the MV Geo Coral kicking its heels and doing wheelies up in the Carnarvon basin, waiting to be allowed to commence the Scarborough 4D survey, my thoughts have been focused on the future of seismic surveys in Australia. And anyone who knows me well knows that this is a subject close to my heart.

I thought it was interesting to contrast the language used in the media to explain seismic surveying depending on the context. When speaking about Woodside’s Scarborough seismic, the words used are “Seismic blasting involves firing high powered compressed air cannons at the ocean floor in order to identify oil and gas reserves through the sound produced.”

When talking about Woodside’s Scarborough seismic, the words used are “Seismic reflection works in a similar manner to ultrasound data, sending pressure waves through the ocean and its floor and detecting the energy that is reflected back.”

In the shadow of this reporting bias what can we really say about our industry that won’t be turned back around onto us.

Last year we made the first award of the Barry Goldstein Medal for Innovation, Collaboration and Communication in Geoscience. This medal was set up to honour the life of a man who was a visionary with endless energy to drive positive change in the industry. With his passion and dedication to PESA over the years, it felt right to mark his passing with an award that could recognise those with similar values and skills. This year we were pleased to award this prize to Jon Cocker for the innovation, and communication skills he has shown in the field of seismic acquisition. Jon had an instrumental role in setting up the collaborative research project with the fishing sector, and government bodies to study and monitor before and after impacts of marine seismic surveys on sea life in the Bass Basin.

And this study may help to dispel some of the myths and outright falsehoods that often get quoted with reference to these surveys.

We are delighted with the work that Jon, and so many other communicators within our industry are doing to help swing the tide of misinformation out there. But it is sad to see that there is little to no mention of this study in the mainstream media, and yet few of us (at least in Western Australia) could have missed the news that Woodside’s Scarborough 4D survey (that hadn’t even commenced yet) was clearly linked to the beaching of 100 pilot whales in Albany 1800km away, and in a different ocean.

Helen Debenham
PESA FEDERAL PRESIDENT
CARNARVON’S PATH TO PARADISE IS PAVED WITH PAVO ASPIRATIONS

ARNARVON Energy has shifted focus back to its core business of exploration with the spotlight specifically on Pavo, the biggest oil discovery in Australia in 2022 which is located only 40km away from Dorado presenting superb tie-back potential to the latter. Similarly to Dorado, the Pavo-1 well proved the existence of a substantial volume of light oil in excellent quality reservoirs with a gross contingent resources (2C) estimated at 43MMbbl and additional prospective resources at Pavo South of 66MMbbl (Pmean), within the WA-438-P permit in which Carnarvon holds a 20% stake.

Chief Operating Officer Phil Huizenga said the company had revised its strategy and would be playing to its strengths moving forward.

“When Dorado comes off peak production due to natural decline, we plan to bring in Pavo to maintain high facility production rates,” Huizenga said, outlining one long-term objective of maintaining low per barrel operating costs in the coveted hydrocarbon rich postal code.

More recently the company halved its stake in Dorado by selling 10% to Taiwanese State-owned company CPC for $227 million. Huizenga said the deal had made the company far more manoeuvrable as it strives to extract more headline hydrocarbons out of its Bedout Basin basket.

He said the company’s recent completion of the sale to CPC (Santos holds the remaining 80%) had put the West Perth hydrocarbon hunter in the black with $180m in the bank and an additional $138m available to help fund the development at Dorado flagged for FID in 2024.

“We are not worried about funding, and we’ve got the money to go after both Bedout exploration drilling and the Dorado development, whereas prior to the CPC transaction we were in the middle of a process that was proving to be quite sluggish due to circumstances beyond our control,” Huizenga said.

With Carnarvon’s 10% share of Dorado development cost obligations now halved to about $200m, Huizenga said the company could shift focus with its cashed-up war chest to pursuing exploration and other initiatives along with the Dorado development. He described Pavo as being on trend with Dorado, emphasising that there were “no doubts about the quality of the reservoir” in a headline act set to anchor Carnarvon onto the North West Shelf for the foreseeable future.

“Our immediate objective, now we have the funding to progress Dorado to FID, however, is to get back to drilling as exploration is in our blood and securing environmental approvals and going after really big prospects is our DNA,” Huizenga said.

This is good news for the industry considering that Carnarvon on the sea, like hockey legend Wayne Gretsky on the ice,
is a hall of fame member in its field and has ticked some big boxes on the North West Shelf.

Carnarvon Managing Director Adrian Cook has always been an admirer of Gretzky and likes to apply his sporting philosophies to Carnarvon’s exploration endeavours.

Dorado, nevertheless, still exceeded expectations and delighted the explorers on its deliverables.

“Dorado surprised us on the upside. We discovered 20% porosity, when we were expecting 15%. Permeabilities ranged between 100 to 1,000 millidarcy in the Caley hydrocarbon zone. So, we have excellent porosity and permeability and fantastic light oil,” Huizenga reflected on the jewel in the crown.

Since then, however, it seemed likely that at some point anxieties might boil over on the turbulent ride to start-up and that inflection point flared in August when Carnarvon released its end of year financial report and commented on senior joint venture partner Santos’ start-up delays at Dorado.

In a view about the operator of Dorado, Carnarvon chairman Bill Foster vented what he stressed was “personal frustration” by stating in the report: “Our partner (Santos) and operator of the Dorado development has not progressed activity at a pace that Carnarvon wishes, despite the best wishes of Carnarvon.”

“This delay to FID had a knock-on impact to Carnarvon’s share price which was particularly disappointing for shareholders. Strategically, we have been running multiple funding options that enabled us to secure capital for the Dorado development from an asset sell-down rather than an equity raising,” Foster added.

Santos has not commented on the Foster’s statement, which were backed by Cook who described Dorado – the biggest oil discovery in Australia for the past 30-years containing a light oil, 60° API 2C discovery of 170MMbbl – as having been “technically ready” for FID over the course of the past year.

“Disappointingly, at the end of the period, the FID for the Dorado development is yet to be realised, with the joint venture (now) planning for FID in 2024,” Cook said.

Supply chain uncertainties and inflationary pressure had been cited for a repeated shifting of the goalposts. In 2018 Cook suggested to PESA News that the JV was targeting FID as early as 2020, which would have made production a very lucrative likelihood by now considering that Brent Crude was
trading around US$90/barrel at the time of going to press. In the interim, Cook and Carnarvon have had a period of reflection of one Gretzky motto, applied to exploration: “Skate to where the puck is going, not to where it has been.”

Carnarvon has always played to its strength in the exploration arena and has played the long game in an area where successes aren’t guaranteed. In a ploy straight out of the Warren Buffett playbook, Carnarvon took advantage of oil prices crashing to US$26 in 2016 by snapping up quality acreage on the North West Shelf for basement bargain prices at a time when exploration was taking a backseat to production.

By illustration, during the boom times Woodside had acquired several blocks on the NWS for $200-$300m. Carnarvon was subsequently able to pick up a block next door to its illustrious neighbour for a $2m commitment.

“We had figured you can’t stop exploration for three to five years without consequences. The oil price would have to increase sometime in the future and when that happened, people would want to drill more wells and would need acreage,” Huizenga had said of the original, Gretzky-inspired gameplan.

While those permits in the Vulcan sub-basin didn’t quite meet the Gretsky heights, they ensured that Carnarvon remained in the exploration game.

Carnarvon was spot on with the oil price rebounding, but was unable to forecast (as it chased the Gretzky puck) that Covid-induced lockdowns would paralyse the movement of people, ships, planes and cars and plunge oil prices to historic lows of US$17 a barrel during a crucial phase of the Dorado story. That was until it shot up to over $120 a barrel in early 2022 after the Russia invasion of Ukraine, which coincided with the Pavo discovery.

You might tell your grandchildren the story one day and wonder if they had believed you!

THE JUICY GEOLOGY THAT HAS PAVO PIONEERS SALIVATING

ROISIN McGee, Geoscience Manager at Carnarvon Energy, has unpacked for PESA News the geological attractions that resulted in the prolific Pavo discovery.

Like Dorado, the Pavo structure was created by the erosion of the early Triassic-aged Dorado Canyon. The Greater Pavo structure consists of a northern and southern culmination, which are separated by minor tributaries associated with the Caley unconformity erosional event (see Figure 1).

The Pavo-1 well targeted the Caley reservoir on the northern culmination and in March 2022, discovered a 60m gross oil column consisting of light sweet 52° API oil with a low gas-to-oil ratio. The gross 2C resource of Pavo was estimated by Carnarvon to be 43 million barrels within the Northern culmination.

The Caley reservoir is a member of the Early Triassic Archer Formation and at Pavo-1 is of excellent quality.

The Caley member at Pavo is approximately 900m shallower than at Dorado and is recognised to be in a relatively more proximal location in the Caley deltaic depositional system.

Putting the elements together of an outstanding reservoir, the light nature of the crude, and a likely strong aquifer drive, the recovery factors at Pavo are inferred to be extremely good.

Separated by only a narrow saddle (see Figure 2), the Pavo South prospective structure is estimated by Carnarvon to contain an additional 66 million barrels of oil in the most likely scenario (prospective, Pmean). Given its proximity and similar seismic characteristics to the field already discovered at Pavo, the Pavo South structure has an excellent geological chance of success, evaluated at around 60%.

The key risk identified at Pavo South is oil migration from the northern Pavo structure through to Pavo South. Indications of a residual or palaeo-oil-water contact (“POWC”) in the Pavo-1 well at depths deeper than the interpreted spill point between the north and south formations may suggest that the greater Pavo structure had once been a larger, consolidated trap (see Figure 3). If this was the case, a common
deeper contact supports the charging of both structures with the same oil that was discovered in the Pavo-1 well.

The Hove member fills the Dorado Canyon and effectively seals the sub-cropping Caley reservoir at Pavo as well as Dorado. The Hove shale appears to thicken from the north at Pavo southward to Pavo South and is predicted to be the cap rock of several more leads and prospects under the Caley unconformity within WA-438-P. These closures pose substantial upside for this Caley/Archer play system, which is only one of many play systems identified in the Bedout sub-basin by the Carnarvon-Santos-CPC Taiwan Joint Venture.

An artist’s impression of the Dorado Project, which has now been flagged for FID in 2024.

**Figure 1:** Depth structure maps highlighting narrow separation of Pavo and Pavo South. **Figure 2:** Seismic line (A – A’) across the North and South culminations at Pavo. **Figure 3:** High confidence in the presence of oil in Pavo South through evidence of potential residual oil-water contact.
South Australia is currently the focus of company natural hydrogen exploration in Australia. Why the current interest?

1. Zgonnik (2020) first drew attention to anomalous hydrogen contents in gas samples taken from South Australian oil bores. 50-80% hydrogen content was measured in 1931 by the Mines Department in gas samples taken by the Chief Government Geologist – potential evidence that natural hydrogen has been generated (e.g. Ward, 1932). Gas samples from Robe 1 (drilled in 1915, Otway Basin) recorded 25% hydrogen, American Beach Oil 1 (drilled in 1921, Kangaroo Island) 51-68% hydrogen and the Ramsay Oil Bore 1 (drilled in 1931, Yorke Peninsula) 60-84% hydrogen.

2. Salt lakes on Yorke Peninsula and Kangaroo Island have been interpreted as potential ‘fairy circles’ by Moretti et al. (2021).

3. South Australia took the lead nationally in enabling exploration licences for natural hydrogen on 11 February 2021 when amendments to the Petroleum and Geothermal Energy Regulations 2013 declared hydrogen, hydrogen compounds and by-products from hydrogen production ‘regulated substances’ under the Petroleum and Geothermal Energy Act 2000. Companies are now able to apply to explore for natural hydrogen via a Petroleum Exploration Licence (PEL) and the transmission of hydrogen or compounds of hydrogen via a Pipeline Licence is now permissible.

Since February 2021, seven companies have lodged over 40 applications for...

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Figure 1: Petroleum Exploration Licences and applications known to be targeting natural hydrogen. Wells with anomalous measured hydrogen contents in gas samples are shown.
PELs targeting natural hydrogen over the State’s basins and crystalline basement provinces (Fig. 1). The first of these (PEL 687) over Kangaroo Island and Yorke Peninsula was granted to Gold Hydrogen Pty Ltd in July 2021. The second licence (PEL 691) was granted to H2EX in June 2022 on Eyre Peninsula.

This year Gold Hydrogen have completed a soil gas survey with CSIRO and an extensive airborne geophysical survey on Yorke Peninsula. The company is now working towards drilling an exploration well in October 2023 near the Ramsay Oil Bore on Yorke Peninsula. H2EX have completed a soil gas survey with CSIRO in their licence on Eyre Peninsula. Both companies report encouraging hydrogen indications from the soil gas surveys.

In Western Australia, the CSIRO reported hydrogen occurrences in soil gas surveys in the Yilgarn and north Perth Basin (e.g. Frery et al. 2022) and hydrogen has been recorded in petroleum wells stimulating interest from explorers. The WA Geological Survey has also been keeping an eye on natural hydrogen and helium potential.

In late 2022 the Western Australian government announced the Petroleum Legislation Amendment Bill (No. 2) 2022 to enable exploration and production of naturally occurring hydrogen through petroleum titles granted via the Petroleum and Geothermal Energy Resources Act 1967 (PGERA) and Petroleum (Submerged Lands) Act 1982 (PSLA). The Bill adopts the South Australian concept of ‘regulated substances’ as the mechanism for introducing naturally occurring hydrogen into existing legislation.

Geoscience Australia has been ahead of the curve actively researching natural hydrogen. Boreham et al. (2021) was the first published review of Australian hydrogen occurrences.
NEW SUPPLY CHAIN MODEL TO ASSESS VIABILITY OF SEABOUND HYDROGEN ECONOMY

A team of researchers has created a new supply chain model which could empower the international hydrogen renewable energy industry, according to the University of Technology in Sydney.

UTS said that while hydrogen has been touted as the clean fuel of the future in that it can be generated from water and produces zero carbon emissions it is, however, expensive to transport over long distances and currently there is no infrastructure in place to do so.

Nevertheless, the new supply chain model, created by researchers in Australia, Singapore and Germany, successfully guides the development of international transport of hydrogen and its embodied energy.

The full report was recently published in the peer-reviewed journal, Energy Conversion and Management.

Associate Professor Kaveh Khalilpour, from the University of Technology Sydney and lead of the report, said supply chain design is critical for making hydrogen economic.

“We looked at the renewable hydrogen export from Australia to Singapore, Japan, and Germany. Surprisingly, the analysis revealed that it matters whether the goal is to export ‘hydrogen the atom’ or ‘hydrogen the energy’. Each choice leads to a different supply chain system.

“Therefore, a thorough understanding of the whole system is necessary for correct decision making,” said Associate Professor Khalilpour.

“The abundance of renewable energy resources in Australia, as well as its stable economy, means the country can attract investments in building these green value chains in our region and even as far away as Europe.”

Hydrogen is expected to help diversify Australia’s renewable energy resource beyond solar and wind power. This is seen as critical to the country’s energy security, as well as necessary for climate change mitigation.

“Hydrogen is just an energy carrier, i.e. not a primary energy source, and thus only a means to an end for transporting renewable energy from one place to another.

“The key business question around the emerging hydrogen economy is whether commodities such as green hydrogen, methanol or ammonia can be exported profitably and competitively also over long distances and across the oceans, thus bringing green energy to other places in the world.”

“If this is so, this will also have major international energy and climate policy implications,” said Professor Reinhard Madlener, co-lead of the project, from RWTH Aachen University, Germany.

“Our model suggests that methanol shows great promise as a chemical carrier for exporting renewable energy from Australia at low costs,” said Professor Iftekhar Karimi, from the National University of Singapore, and co-lead of the project.
Report Finds Growing Role for Natural Gas in Fuelling WA Economy

An independent report into Western Australia’s gas market has highlighted the growing importance of natural gas in WA’s energy mix and the need for investment in new supply.

Rystad Energy found policy and regulatory stability remained vital for the gas industry to invest $11 billion in new supply needed to meet demand in WA over the next decade.

The Western Australia Domestic Gas Policy Study, commissioned by the Australian Petroleum Production & Exploration Association (APPEA), found that new gas supply from the Perth Basin and Scarborough would be key to addressing near-term market tightness but significant new supply would be needed to meet growing demand after 2030.

“New gas supply is needed to offset declining production from legacy fields and meet growing demand,” Rystad Energy said.

“Gas demand will remain robust through to 2033, with new gas plants needed to support planned coal retirements and the expansion of renewables in the power sector alongside an almost doubling of industrial demand for gas.”

The Rystad Energy report also found that the LNG Domestic Market Obligation had supported gas supply and price stability in WA, delivering a gas price benefit to domestic customers of around $1.2 billion each year.

Allowing onshore gas projects to access export markets would expand the number of commercially viable projects, unlocking new supply and delivering benefits to the WA market.

According to Rystad Energy “Access to larger export markets reduces the domestic price required for fields to become commercial while improving access to capital and financing”.

In its submission to the Inquiry, APPEA has recommended the review should focus on promoting new gas supply, arguing timely and affordable delivery of gas to the domestic market could be helped by:

- Removing the export prohibition for onshore gas projects.
- Avoiding changes to current offshore domestic market obligations (DMO).
- Establishing a regulatory framework for unconventional gas reserve development.
- Faster approvals to unlock new gas supply.
- A framework for price transparency developed in collaboration with industry.

APPEA WA Director Caroline Cherry said: “The industry is committed to providing a secure, reliable and affordable supply of natural gas to WA’s households and businesses.

“Gas is critical to WA’s cleaner energy future and net zero targets, powering WA’s growing resources sector and supporting the South West electricity system as coal-fired power exits.

“The development of WA’s world-leading LNG export industry has been a critical driver of the State’s energy security and underpins supply and lower prices while delivering substantial economic benefits to WA.

“Securing these benefits for WA in future years requires a stable policy and regulatory environment that provides certainty to natural gas sector participants and investors.”

Ms Cherry said recent changes to the Domestic Gas Policy in WA before the conclusion of the Inquiry were contrary to policy and regulatory stability and put at risk adequacy of future domestic gas supply in WA.

“Critical investment has been put at risk at a time when the state needs more gas supply to meet growing demands,” she said.
Shearwater Announces Seismic on Steroids with NVIDIA GPU-Acceleration

Shearwater GeoServices has announced a key performance milestone to its most complex seismic processing algorithms, part of the Reveal seismic processing software and based on NVIDIA GPUs to achieve 10x faster performance and improved energy efficiency.

This follows the announcement in August 2022 of a technology collaboration between Shearwater and NVIDIA. Seismic processing is a key workflow for energy companies to optimise oil & gas exploration and production (E&P)—providing a reliable supply of fuels to meet surging demand worldwide.

The significant step forward in these efforts is achieved through a 10x speed-up of Reverse Time Migration (RTM) and Kirchhoff algorithms, powered by NVIDIA GPUs, to lower total power consumption for compute-intensive workloads, improve energy efficiency, and reduce operating costs.

Shearwater and NVIDIA continue to collaborate to further increase and optimise the available portfolio of GPU-accelerated tools in Reveal to ensure Shearwater’s customers can run optimally scaling seismic workflows on their GPU-accelerated HPC infrastructure, in areas such as surface related multiple removal and FWI imaging. Enabling customers to run optimally scaled seismic workflows on their GPU-accelerated HPC infrastructure will reduce processing time and lower carbon emissions from oil & gas operations.

“This is an exciting and important collaboration and a fantastic example of the commitment by Shearwater to develop and deploy state-of-the-art technology and software for the benefit of our clients,” said Simon Telfer, SVP Software, Processing and Imaging at Shearwater. Reducing cycle time and lowering emissions are key objectives for Shearwater and, producing a 10x speedup of algorithms using power efficient GPU hardware in this partnership with NVIDIA is a significant step forwards in this work.

“Shearwater has made great progress in accelerating Reveal on NVIDIA platforms. Their close collaborations demonstrating their commitment to providing customers with the best performance at the lowest cost and carbon footprint,” said Marc Spieler, Sr. Director of Energy at NVIDIA.

Shearwater Reveal improved performance also leverages NVIDIA Bitcomp, part of the nvCOMP library used in fast lossy data compression and decompression, for reverse time migration (RTM) and was rolled out in production and used regularly across Reveal. This library allows for accelerated compression of seismic snapshots and is an efficient way to compress wave-fields. Bitcomp reduces the memory transfer load between CPU and GPU and is becoming industry standard. This results in a more efficient RTM workflow with significant speed-ups over workflows not leveraging the compression library, with one oil & gas customer achieving 8x speed-ups in application performance. Additionally, the solution allows users to run larger simulations given the available memory on the GPU.

Leading energy companies use Reveal to enhance their seismic processing workflows NVIDIA Tensor Core GPUs have been used to accelerate the performance of high-end seismic data processing and imaging algorithms in Reveal, enabling faster and more accurate estimation of subsurface properties in complex geological settings. This ultimately translates to faster time-to-oil, to improved subsurface imaging in a fixed time frame, and revenue opportunities for energy providers. In addition to E&P, Reveal is used to process seismic data for shallow hazard mapping, windfarms planning, geothermal projects, and carbon capture, utilisation, and storage (CCUS).

Tamboran Intersects 90-metres High quality Mid Velkerri B Shale in the Beetaloo

Tamboran Resources announced two major milestones in late August as the Shenandoah South 1H (SS1H) well in EP 117 reached a Total Depth (TD) of 3,300 metres, intersecting approximately 90 metres of high quality Mid Velkerri B Shale with strong dry gas shows.

Tamboran said this represents the thickest section of Mid Velkerri B Shale seen in the Beetaloo Subbasin to date, while the new Helmerich & Payne super spec FlexRig® Flex 3 rig had set a new record for wells drilled below 3,000m in the Beetaloo Sub-Basin by reaching Total Depth of the pilot hole in 21.5 days, drilling at 153 metres per day.

Tamboran said logging of the Mid-Velkerri B Shale formation had indicated higher porosity and gas saturation relative to offset wells, consistent with the Marcellus Shale in the US.

Initial evaluation confirms reservoir continuity of the Mid Velkerri B Shale over 150km between the Amungee 2H and Beetaloo W1 wells. This includes a target development area of...
approximately 1 million acres where the shale depth exceeds 2,700m, Tamboran said.

At press time Tamboran was preparing to drill a 1,000-metre horizontal section within the shale formation ahead of a stimulation program of up to 10 stages over a 500-metre section, set for the fourth quarter of 2023.

Tamboran Resources Managing Director and CEO, Joel Riddle, said: “I am extremely excited by the immediate improvement in drilling efficiency of the H&P rig and initial results from the logging of SS1H. Initial data supports our view that the deeper areas in the Beetaloo Basin contain some of the thickest and highest quality B Shale intersected to date in the Beetaloo Basin. The 90 metres of Mid Velkerri B Shale is approximately 20 per cent thicker than the Tanumbirini area.

“Preliminary observations suggest the rock properties continue to compare favourably to that of the Marcellus Shale in the U.S. The Marcellus is globally recognised as the most prolific shale basin in the world, with production exceeding 25 BCFD during 2022.

“The Marcellus helped the northeastern United States achieve material greenhouse gas emission reductions as gas fired power replaced coal fired power across the region. We hope Australia can follow.”

Tamboran Increases East Coast LOIs to 600 – 875 TJ Per Day

Prior to SS1H’s success, Tamboran had upped the ante in its commitment to East Coast Gas supplies by signing non-binding Letters of Intent for an additional 90-125TJ per day (33-45 PJ per annum) with Alinta Energy and ENGIE.

This increases the total potential volume of Tamboran’s low-reservoir CO₂ Beetaloo Basin gas supply to 600 – 875 TJ per day (220 – 320 PJ per annum) for up to 10 – 15 years.

Tamboran said the LOIs are conditional upon the Parties agreeing to non-binding term sheets and working toward executing binding Gas Sales Agreements, including purchase price, transport arrangements and other key commercial terms.

On securing binding GSAs with the Parties, Tamboran said it would progress APA Group’s proposed pipeline between the Beetaloo Basin and the East Coast gas transmission network.

Tamboran plans to commence first gas via the new proposed Beetaloo to East Coast pipeline in 2028, subject to commercial flow rates from the explorer’s Beetaloo Basin assets and standard approvals.
Tamboran said the additional volume initiatives demonstrated the long-term interest in securing gas for Australia’s East Coast, where current supply is expected to fall significantly in coming years due to a lack of investment and slow approvals.

Tamboran Managing Director and CEO, Joel Riddle, said: “We continue to experience significant interest in purchasing low-reservoir CO₂ gas from our Beetaloo Basin assets delivered into the East Coast over the long term. We believe this demonstrates the longevity of demand for gas on the East Coast.

“The total volume under interest from the six parties we have received LOIs from to date reflects ~40 – 55 per cent of 2023 East Coast gas demand (excluding LNG) as forecast by the Australian Energy Market Operator (AEMO). We look forward to working closely with the buyers to support their ongoing gas needs and provide energy security to Australians in the Northern Territory and East Coast over the long term.”

**Longest Deep-Crustal Seismic Survey Ever Conducted by Geoscience Australia is Completed in Central-Western Queensland**

More than 1,700 kilometres of new data was collected as part of the $30.9 million Data Driven Discoveries program, which aims to reveal new insights into the hydrogen storage,
groundwater and minerals potential of the under-explored Adavale Basin.

The program used Vibroseis trucks – trucks fitted with vibrating plates – to send soundwaves into the ground, which then bounced off underground rock layers – like taking an ultrasound of the earth.

The reflected signals were recorded back at the surface by small sensors called geophones, which were placed at regular intervals along the survey line. The data was then downloaded off the geophones, processed using sophisticated computer software and combined to create an image of the Earth.

"Using Vibroseis trucks for seismic surveys is advantageous as it’s non-invasive and can cover large areas efficiently, making it suitable for regional studies such as this one across the Adavale Basin,” Director, Strategic Basins, Mitchell Bouma said.

Working in collaboration with the Geological Survey of Queensland, Geoscience Australia re-examined decades-old seismic data and collected new geoscientific data to identify opportunities for resource discovery.

In addition to collecting 1,715 kilometres of new data, Geoscience Australia also reprocessed approximately 2,350 kilometres of historic data from the Adavale Basin.

“The amount of reprocessed data alone is equal to more than half the width of Australia,” Mr Bouma said.
“It’s a huge amount of data. By modernising this historic data from the 1960s to the 1980s and linking it with the newly acquired seismic data, the program will provide a more detailed understanding of the basin’s resources and geological storage potential.”

This includes its potential for storing hydrogen or carbon dioxide underground, as the Adavale Basin is home to the largest known thick salt accumulation in eastern Australia, the Boree Salt deposit. This deposit could be used to safely store hydrogen gas. Just one salt storage facility could provide more energy than the largest battery power plant in Australia.

The data from the survey will also be used to learn more about how the Australian crust evolved throughout geological time.

“By harnessing the power of historic and cutting-edge scientific data, we can accelerate discoveries to support Australia’s energy transition,” Mr Bouma said.

Chevron Funds New Soil Carbon Capture Pilot and Blue Carbon Research Projects in Western Australia

In its first nature-based carbon offsets project in Australia, Chevron will provide funding to the WA-based Carbon Sync, which is leading a soil carbon sequestration pilot project involving up to 80,000 hectares of WA’s cropping and grazing region.

Chevron has also joined a multi-year research project with Deakin University’s Blue Carbon Lab to explore potential CO₂ sequestration opportunities in WA’s coastal wetlands.

Chevron New Energies Vice President of Offsets and Emerging Barbara Harrison said, “We believe that the future of energy is lower carbon. Australia is not only an essential part of Chevron’s established portfolio, but we also see tremendous potential to develop businesses that help achieve our lower carbon aspirations.”

Chevron Australia’s General Manager, Energy Transition, David Fallon agreed. “The two projects we are part of in WA are examples of the multiple pathways on that lower carbon journey. Our collaboration with Carbon Sync is expected to provide critical insights related to soil carbon projects, in a region with large potential for scale to help meet the forecasted demand for Australian Carbon Credit Units (ACCUs),” Fallon said. “With the Blue Carbon Lab contribution, we are excited to explore the opportunities for blue carbon in WA’s saltmarsh, mangrove and seagrass environments.”

Carbon Sync Founder and CEO Louise Edmonds said, “I am thrilled that a large multinational organisation has recognised the potential of Carbon Sync to change the carbon equation for WA’s agricultural industry, as well as create jobs and further investment for our state. Through these pilot projects, we aim to enhance the sustainability of WA’s agricultural sector and improve biodiversity outcomes.”

Professor Peter Macreadie, Director of Deakin University’s Blue Carbon Lab, said, “there’s been great mystery into the size of WA’s blue carbon assets and the potential for new blue carbon opportunities through the conservation and restoration of coastal wetlands. This research project seeks to address this knowledge gap.”

Former Santos COO Takes the Reins at Beach Energy

Beach Energy has appointed Mr Brett Woods as Managing Director and Chief Executive Officer.

Mr Woods has over 25 years of experience in upstream oil & gas including most recently 10 years at Santos where he undertook a number of executive roles including Chief Operating Officer, Vice President Developments and Vice President Eastern Australia business unit.

Beach chairman Glenn Davis welcomed Mr Woods on behalf of the board.

“Brett is an experienced oil & gas executive with a track record in strong leadership, delivering operational excellence, project delivery and value creation for shareholders. He is a very experienced technical oil & gas leader with the skills and background to continue to strengthen our performance culture and operational delivery.”

Mr Woods said: “Beach is in a great position with a strong portfolio of assets and a great balance sheet. I am excited to join at a time where I can help the team deliver the current projects, drive Mr Morné Engelbrecht ended his tenure as CEO. Mr Davis thanked Mr Engelbrecht for his leadership of, and contribution to, Beach both as CEO and before that as CFO.

“Morné excelled in his role as CFO and stepped into the CEO role at an uncertain time and has since guided the company through a number of operational challenges. Despite those challenges our project delivery continues to advance and Morné should be proud of his contribution to Beach. He leaves the company in good shape as evidenced by the strong recent quarterly results. On behalf of the board, I thank him for his commitment and hard work.”
APPEA Says Victorian Home Gas Ban Ignores Importance of Gas in Net Zero Energy Mix

The Victorian Government’s gas ban for new homes ‘ignores the fundamentals of the energy system transformation to net zero including the importance of gas as a partner to renewables in reliable electricity generation’.

This was the reaction of the Australian Petroleum Production & Exploration Association (APPEA) to the development. APPEA said the Government’s policy shifts the burden on to consumers, pushing households on to an already strained coal-based electricity grid and ignoring the urgent need for new local gas supply to reduce emissions and put downward pressure on prices.

APPEA Chief Executive Samantha McCulloch said: “With more than 60% of Victoria’s electricity coming from coal, the focus should be on reducing emissions from the power sector, through renewable energy and firming gas power deployment, before adding to power demand.

“The Victorian Government is taking choice away from consumers for limited climate benefit while ignoring the fact that the best way to bring gas prices down is to invest in more gas supply. “Victorians are paying at least $2/GJ more whenever gas is imported because the state has outsourced its energy security to Queensland by stifling onshore development for a decade with regulatory uncertainty and gas exploration bans.”

Ms McCulloch said Victoria should be heeding the calls of the Australian Energy Market Operator (AEMO), which recently warned the state needed “substantial volumes of gas” to avoid shortfalls in coming years because it was relying on Queensland.

“The best way to avoid shortfalls and put downward pressure on prices is to bring on new gas supply close to where it is used because the cheapest gas is the gas closest to the customer,” she said.

“We need to ensure policy is based on robust, evidence-based analysis that recognises the importance of gas in supporting the transition of our energy system to net zero.”

China’s Shanxi Province Achieves Record Unconventional Gas Production

China’s state-owned news agency, Xinhua, says the production of gas in north China’s Shanxi Province increased 5.7% to 6.82 billion cubic metres in the first half of 2023, setting a new record for the major coal region.

Shanxi has prolific resources of unconventional gas and activities including coal bed methane, tight sandstone and shale gas and by the end of 2020 had declared a total proven geological unconventional gas reserve of 1.06 Tcf.

Xinhua said that Shanxi’s rise in unconventional gas production had risen from 8.15 Bcm in 2020 to 11.33 Bcf in 2022 and annual average growth was nearly 1.6 Bcf.

In a separate report, Xinhua said Chinese engineers had broken new ground on a super new drillhole that would 10,520m at the Sichuan Basin in southwest China in the search for gas reserves.

This was announced just a few weeks after China began drilling an even deeper well to a planned depth of 11,100m in at the Tarim Basin in the northwest autonomous region of Xinjiang.

Should both wells reach target depths, they will be two of the deepest in the world, but not deeper than the Kola well in north-west Russia that took 20-years to complete and reached 12,262m.

Gas Investment Critical as AEMO Warns Blackouts Looming

The urgent need for new gas supply has been laid bare in an independent report warning of a “material risk” to Australia’s power supplies because of future gas shortfalls and a lack of investment in gas generation.

In its 2023 Electricity Statement of Opportunities (ESOO), the Australian Energy Market Operator (AEMO) said the “ongoing availability” of energy sources such as gas “will be critical to the reliability” of the National Electricity Market (NEM).

Australian Petroleum Production & Exploration Association (APPEA) Chief Executive Samantha McCulloch said the report underscored the critical need for new gas supply and gas generation capacity to ensure energy security as part of the net zero energy transformation.

“Gas is one of the main sources of electricity generation in Australia and is crucial to keeping the nation running,” Ms McCulloch said.

“AEMO have highlighted that gas will play an increasingly important role in...
our electricity mix, as a reliable partner to renewables and as coal generation is phased out.

“Gas is the safety net we need as we transform our electricity system and governments must start listening to the repeated warnings from independent authorities of the need for new gas supply.”

AEMO estimates that over 1.5GW of new gas power generation capacity is needed in New South Wales and Victoria by 2026/27 in order to meet current reliability standards.

The report singles out Victoria, with retiring coal generation and underinvestment in new gas supply putting pressure on the electricity system and contributing to a significantly increased risk of inadequate and unreliable electricity for Victorian homes and businesses compared to the 2022 ESOO report.

Ms McCulloch said: “The report shows how illogical Victoria’s new home gas connection ban is by pushing households on to an electricity grid that is already struggling to meet demand.

“Within a few years, Victoria will fail to meet minimum reliability standards set by AEMO, increasing the risk of rolling blackouts.”

In NSW, AEMO said there were “significantly increased risks if thermal fuels are more scarce, highlighting the importance of maintaining the availability of coal, gas and distillate fuels, and the effective management of their supply chains.”

**NEW APPEA Queensland Director Aims to Ensure State Maintains Gas Momentum**

Australia’s oil & gas industry has named its new Queensland Director to ensure the state continues to share in the benefits of the gas industry on the path to net zero.

Keld Knudsen joins the Australian Petroleum Production & Exploration Association (APPEA) Brisbane office after previously serving a decade with the organisation from 2011 to 2021.

Mr Knudsen has extensive experience in energy policy, including 3 years as APPEA’s Northern Territory Director overseeing advocacy efforts during the regulatory processes that paved the way for onshore development approvals in the Beetaloo Basin.

He has worked in government relations for APPEA member Santos in Queensland, New South Wales, and the Northern Territory for the past two and a half years.

Mr Knudsen said: “I’m thrilled to be back working for APPEA members again in a region critical to Australia’s cleaner energy future. At a time when gas supply shortfalls are forecast in southern states, Queensland is keeping the lights on for millions of homes and businesses on the east coast because it understands the value of gas in so many different ways to the economy and its people.

“With over 30,000 jobs supported along the Queensland supply chain, the industry is also responsible for delivering $1.4 billion a year of royalties on average to the state Budget, helping fund important infrastructure like hospitals, schools and roads.

“The sector is strong here because of the positive collaboration between governments and industry, including the development of world-class LNG export projects at Gladstone, and I’m keen to keep the momentum going to get the best outcomes for Queensland.”

APPEA Chief Executive Samantha McCulloch said: “When Queensland is so pivotal to the east coast energy market, our Queensland members will be well served by Keld’s breadth of experience in our industry and I welcome his return to the team.

“Keld brings extensive experience across stakeholder engagement, policy development, government relations, and communications.

“He has worked collaboratively with industry stakeholders, government bodies and local communities to drive sustainable growth, foster innovation, and champion responsible resource development practices.

“He is a valuable addition to the team and will help secure a prosperous and sustainable future for Queensland’s energy industry. Natural gas will continue to play a vital role in lowering emissions and partnering with renewables for reliable electricity in Queensland and around the country.

**North America to Dominate Global LNG Additions Through 2027, says GlobalData**

North America will continue to dominate the global liquefied natural gas (LNG) liquefaction capacity additions, contributing about 60% of the total capacity additions between 2023 and 2027, according to GlobalData, a leading data and analytics company.

GlobalData’s latest report, ‘LNG Liquefaction Terminals Capacity and Capital Expenditure (CapEx) Forecast by Region, Key Countries, Companies and
Projects (New Build, Expansion, Planned and Announced), 2023-2027’, reveals that North America is expected to witness the highest capacity additions globally, by gaining a total capacity of 284.1 mtpa (million tonnes per annum) from new build and expansion projects during the outlook period.

Himani Pant Pandey, Oil & Gas Analyst at GlobalData, comments: “The US will primarily drive the LNG liquefaction additions in North America through 2027, accounting for nearly 76% of the region’s total capacity additions by 2027. Strong global demand for LNG and the availability of abundant shale gas are driving the growth of LNG terminals in North America.”

GlobalData identifies Canada as the second highest contributor to North America’s LNG liquefaction capacity additions, accounting for about 12.3% of the total capacity additions in the region by 2027. The proposed LNG Canada and Bear Head liquefaction terminals are the main drivers for LNG liquefaction capacity additions in the country, with capacities of 14.0 mtpa and 12.0 mtpa by 2027, respectively.

Pandey concludes: “Mexico closely follows Canada, contributing about 11.5% of total LNG liquefaction capacity additions in North America during the outlook period. The Sonora and Amigo floating liquefaction terminals, both being planned in the Sonora state, with 14.1 mtpa and 7.8 mtpa by 2027, respectively, will be the primary drivers of capacity additions in the country.”

Wood has been awarded a multi-year enterprise framework agreement (EFA) to continue to provide services to Shell’s global projects.

Wood said that it’s field of expertise in specialist consulting, engineering, procurement and project management expertise would continue with Shell’s greenfield and brownfield projects and in support of projects that ensure energy security and enable energy transition focused on carbon capture, low-carbon fuels and hydrogen. Wood will deploy expertise in decarbonisation, digitalisation and asset life extension to enhance Shell assets worldwide, the company said.

Under the three-year framework, with options for two one-year extensions, services will be provided by Wood’s consulting and engineering teams in Europe, North America, Latin America, South-East Asia, Australia and the Middle East.

Ken Gilmartin, Wood’s CEO, said: “This award continues a 70-year relationship between Shell and Wood, spanning more than 20 countries and numerous major projects. Complex project excellence is where we excel and we are aligned with Shell in our strategic ambitions to deliver the energy the world needs today while simultaneously delivering the energy transition at pace. We look forward to continuing to partner with Shell as we work to design a better energy future together.”

Sercel has announced the launch of MetaBlue, which it describes as a ‘ground-breaking data-driven solution for marine seismic survey planning and management’.

MetaBlue has been touted as an assist to E&P companies and marine seismic
service providers in reducing project turnaround times by ‘seamlessly connecting every phase of a marine seismic project’.

“This innovative solution facilitates greater collaboration between project stakeholders, right from project inception. With all parties engaged from the outset, MetaBlue optimises marine seismic surveys, by driving superior operational performance and guaranteeing delivery of the highest-quality seismic data for unsurpassed subsurface imaging,” said Sercel.

MetaBlue is said to bring a unique advantage to the table in its ability to bring together all the information relating to an offshore seismic survey within a single ecosystem.

Sercel says project stakeholders can easily access and exploit all the different data from the various survey technologies and equipment used throughout a seismic survey, including Sercel’s navigation and planning software, MEMS-based node portfolio, towed-streamer technology, source solutions, and survey optimisation services. By being able to leverage all the survey data from these different project components within the MetaBlue ecosystem, project stakeholders can make holistic decisions at every stage of the survey, revolutionising project planning, execution, and completion.

Emmanuelle Dubu, Sercel CEO, said: “We are delighted to introduce MetaBlue to the market, a true survey game-changer that will reshape the way offshore seismic projects are planned, managed, and executed. MetaBlue’s holistic approach, innovative technology integration, and collaborative focus reflect Sercel’s long-standing commitment to seismic survey innovation and excellence.”

PGS-TGS-SLB Consortium Secures Pre-Funding to Expand MultiClient 3D Seismic coverage in the Sarawak Basin offshore Malaysia

The survey will cover approximately 5,300km² for which the Ramform Sovereign is currently mobilising with completion of acquisition expected late November.

The survey is the third phase of a multi-year contract awarded initially by PETRONAS in August 2020 to acquire and process up to 105,000km² of MultiClient 3D seismic data over a five-year period in the Basin. The first phase of the Sarawak program was acquired in 2021 covering 8,400km² and acquisition of the 6,800km² second phase has just been completed.

“Exploration interest in the Sarawak basin is strong and I am very pleased that we have secured pre-funding for phase three, with mobilisation commencing back-to-back with completion of phase two. The Sarawak basin comprises of a proven petroleum system with many producing fields. By acquiring MultiClient data with our Ramform vessels and GeoStreamer technology, PGS and partners will provide high quality regional scale seismic data that will improve regional understanding of the petroleum systems,” says Rune Olav Pedersen, President & CEO in PGS.

“Sarawak basins are one of Southeast Asia’s most exciting exploration hotspots, with numerous oil & gas discoveries announced in recent months. TGS is pleased to announce Phase 3 of the Sarawak MultiClient program which will support the growing exploration interest of energy companies in this region. Malaysia continues to form a key part of our MultiClient data library, and together with our partners, we look forward to delivering high-quality seismic data across the Sarawak basin,” says Kristian Johansen, CEO in TGS.

PETRONAS, through Malaysia Petroleum Management (MPM) is actively enhancing its data sets that will introduce new plays to be explored, especially in imaging the pre-Middle Miocene Unconformity (MMU) play in the deep-water area of Sarawak Basin. This enhancement will enable clients to effectively conduct assessment on the potential opportunities for exploration and participate in the Malaysia Bid Round.

PGS announces contract awards and MultiClient projects as stock exchange releases if the contract has a value of $10 million or more, MultiClient projects with a duration of two months or more and strategically important contracts. ☞
SHELL REMAINS WORLD’S MOST VALUABLE OIL & GAS BRAND – DESPITE 3% BRAND VALUE REDUCTION

SHELL remains the world’s most valuable Oil & Gas brand despite experiencing a 3% brand value reduction, taking its brand value to US$48.2 billion. This is the ninth consecutive year that the British multinational Oil & Gas brand has held the top spot. However, Saudi Arabian Oil & Gas giant, Aramco (brand value up 4% to US$45.2 billion) has reduced the gap at the top.

Every year, leading brand valuation consultancy Brand Finance puts 5,000 of the biggest brands to the test, and publishes over 100 reports, ranking brands across all sectors and countries. The world’s top 50 most valuable and strongest brands in the Oil & Gas industry are included in the annual Brand Finance Oil & Gas 50 2023 ranking.

Savio D’Souza, Valuation Director, Brand Finance, commented: “The Oil & Gas industry had a record year in terms of profits and cash flow driven by the recovery from the pandemic and geopolitical uncertainty. Geopolitics and economic uncertainty is likely to play a big role in the year ahead too. The challenge for Oil & Gas Brands will be to optimise their brand and business positioning for the Global Energy Transition while balancing their responsibility to provide affordable energy to the world.”
PETRONAS IS AGAIN THE STRONGEST OIL & GAS BRAND, EARNING AAA RATING

In addition to calculating brand value, Brand Finance also determines the relative strength of brands through a balanced scorecard of metrics evaluating marketing investment, stakeholder equity, and business performance. Compliant with ISO 20671, Brand Finance’s assessment of stakeholder equity incorporates original market research data from over 150,000 respondents in 38 countries and across 31 sectors.

PETRONAS (brand value down 7% to US$12.7 billion) is again the strongest Oil & Gas brand, a title it has held since 2020. In 2023 its Brand Strength Index (BSI) score went up two points to 89 out of 100, earning a corresponding AAA rating. This high BSI score comes partly as a result of its commitment to the industry wide energy transition, as it looks to diversify its range of energy options and significantly improve its company-wide sustainability. PETRONAS has committed to allocating 20% of its overall capital expenditure for decarbonisation projects and cleaner energy solutions from 2023 to 2026.

ARAMCO HAS HIGHEST SUSTAINABILITY PERCEPTIONS VALUE, US$4.5 BILLION

As part of its analysis, Brand Finance assesses the role that specific brand attributes play in driving overall brand value. One such attribute, growing rapidly in its significance, is sustainability. Brand Finance assesses how sustainable specific brands are perceived to be, represented by a ‘Sustainability Perceptions Score’. The value that is linked to sustainability perceptions, the ‘Sustainability Perceptions Value’, is then calculated for each brand.

Brand Finance’s research identified Aramco as having the highest Sustainability Perceptions Value of any Oil & Gas brand in the ranking – US$4.5 billion. The brand’s position at the top of the Sustainability Perceptions Value table is not an assessment of its overall sustainability performance, but rather indicates how much brand value the brand has tied up in sustainability perceptions. Aramco therefore has the most value at risk in relation to sustainability. Aramco also had a strong Sustainability Perceptions Score of 5.2 out of 10, which it is taking positive steps to protect.

QATARGAS IS THE FASTEST GROWING OIL & GAS BRAND, UP 147%

Qatargas (brand value up 147% to US$3.1 billion) is the world’s fastest growing Oil & Gas brand, as well as the fastest growing brand across all sectors in the Middle East in 2023. It is one of the world’s leading gas producing brands and is owned by QatarEnergy. This year, it has seen significant growth due to the increase in global demand for its product following the embargo of Russian gas by many countries. It has also benefited from the FIFA Football World Cup which took place in Qatar, for which Qatargas was an Official Sponsor. This has increased its brand awareness outside of its home market and helped boost its BSI score 5 points to 71 out of 100, with a corresponding AA rating.
The Perth Convention Centre is shifting into the spotlight as the focal point for next year’s APPEA Conference and Exhibition, which will be held from May 20-23.

This follows the conclusion of another successful and captivating annual showpiece at Adelaide in May, where the sector again acknowledged exceptional achievements within the oil and gas industry in recent times with the presentation of the Excellence Awards honouring the best environmental, health and safety, workforce and community initiatives.

Award Winners

Woodside Energy was awarded the top APPEA Chair’s Award for its Karratha Education Program – Enriching Educational Opportunities & Achievement. The citation was as follows:

The program has bridged the gap between resources and opportunities available to metropolitan school students compared to those in remote regional centres, providing employment pathways support for Karratha secondary school students over the past 15 years. A collaboration between the North West Shelf Project joint venture partners, St Luke’s College, Karratha Senior High School and the Department of Education, the partnership supports pathways through tertiary education or industry-based careers.

APPEA Chief Executive Samantha McCulloch said the winner of the new award, selected independently, exemplified the way members contributed to the communities where they operated.

“The criteria for this award says it all – recognising culture and leadership, performance and outcomes, engagement and collaboration as well as innovation and advocacy with external stakeholders,” she said. “Programs like this show how Australia’s oil and gas industry can make a real difference in communities across Australia, particularly in remote and regional areas like Karratha, to improve the lives of Australians.”

The initiative was one of three Woodside Energy projects recognised for their excellence in individual award categories alongside other initiatives by Beach Energy and ExxonMobil Australia.

The Karratha Education Initiative took out the Community Development Award category.

The Safety Project Excellence Award went to Beach Energy for its Otway Offshore COVID & Mental Health Management conducted during the pandemic, overcoming the health and safety challenges and restrictions like border closures to continue as one of the few drilling campaigns operating. In collaboration with Diamond Offshore, the program conducted the campaign in the Otway Basin between February 2021 and July 2022 with the Ocean Onyx drilling rig.

Stringent COVID controls and ‘green corridor’ travel pathways enabled the rig to continue operating with only a few days of downtime due to COVID.

The Workforce Development Award was awarded to joint winners, ExxonMobil Australia and Woodside Energy and was applauded for the following outcomes.

ExxonMobil Australia subsidiary Esso Australia’s Mentored Apprenticeship Program is providing skilled employment opportunities to young Australians while helping develop a skilled workforce. Developed with training provider WPC Group, the program has hired and trained 42 apprentices and trainees from diverse backgrounds across Esso Australia’s worksites in Gippsland and Hastings, Victoria since its inception in 2018. Under guidance from Esso’s crew of experienced industry experts, apprentices and trainees are employed across a range of trades: electrical, mechanical, instrumentation and process plant operations. Many of the initial cohort who commenced in 2018 have gone on to employment, working across Longford, Long Island Point and offshore sites.

Woodside Energy was also recognised in the Workforce Development Award for its Navigator Leadership Development Program, improving staff development to support the energy transition. Navigator has become pivotal to integrating heritage BHP Petroleum employees into Woodside Energy and creating the culture of a combined organisation following the merger. It builds diverse capability, embraces cultural change and shapes clear leadership pathways.

Navigator is co-designed with AGSM (the business school of the University of New South Wales (UNSW)) to
ensure quality of, and equal access to, personal development for all employees. The Environment Project Excellence Award was also awarded to Woodside Energy for scientific innovation and collaboration enabling effective management of pygmy blue whales in Australia’s northwest. Collaborating with the Australian Institute of Marine Science and the Centre for Whale Research, satellite tracking technology was used to understand how whales can respond to underwater noise.

This informs Woodside’s offshore activity management while expanding public knowledge to support broader habitat management and conservation efforts.

Ms McCulloch congratulated this year’s winners for their focus on improving outcomes.

“The APPEA Excellence Awards highlight the outstanding work undertaken across our member companies to constantly improve operations for the benefit of the environment, health and safety and the communities where we operate,” she said. “Whether it’s COVID safety procedures, whale protection, education programs for youths or workforce upskilling, these companies are adopting new approaches and technologies to improve outcomes for their own operations and Australia.”

Call for Papers

APPEA has already sent out a Call for Papers for 2024 and invited submissions of a proposal for consideration to present at the 2024 Conference and Exhibition.

The Technical Program Committee welcomes submissions from both Australian and overseas representatives.

Opportunities are now available to present current and topical material associated with the key themes at this world-class event:

- Business Performance & Governance;
- Emission Reductions;
- Engineering;
- Geoscience;
- Health, Safety & Environment;
- Markets.

Speakers from diverse backgrounds, experience and perspectives are encouraged to apply, to present papers on a broad range of industry issues.

**Pancontinental Shines Brightest with Red Hot Namibia Still Glowing**

Pancontinental shareholders are likely to be serenading their stock as the “gift that keeps on giving” as the ASX-listed junior explorer closed the 12-months to 31 August this year with a share price that soared 325% on the rising thermals of some hot oil & gas real estate offshore Namibia.

Data released by Australian Oil & Gas Research has seen Pancontinental, not for the first time, surfacing as this month’s stock star with the company’s large acreage position offshore Namibia staying in the spotlight.

With the drilling of its first well, Comorant-1, imminent at press time, Pancontinental was set to receive $3.7 million from investment partner Africa Energy Corp and as a 20% stakeholder in PEL37 the company is not liable for any drilling costs.

PCL has some distinguished neighbours in Namibia one of whom, none other than ExxonMobil, has farmed-into a second block to the south of PEL 37 in a purchase that shareholders might regard as another vote of confidence in an area of the world that Pancontinental CEO John Begg has described as a “global oil hotspot”.

Shell and TotalEnergies both made giant oil discoveries offshore Namibia in 2022-23.

“We built our position early offshore Namibia and brought together a strong joint venture in PEL 37 that has led to us drilling, with the company holding a free carried 20 per cent interest,” Begg said.

“Our initial technical work is nearly complete in PEL 87. This will soon allow us to release details of the volumetric scale of the very large potential oil traps we are mapping there,” he added.

PCL’s acreage position of 10,970km² in the Orange Basin was enough to woo Woodside into an Option Deed deal with the company in March this year which saw the Australian independent funding a 3D seismic survey that was completed in May.

Overall, the market cap of ASX-listed oil & gas companies grew 8% in the 12-months to 31 August with the billion-dollar cap quintet in AOG1 doing the heavy lifting by expanding 9% in this period. Origin Energy shone brightest in the top tier with a 195% spike in the company’s market cap figures.
### MARKET CAP LIST

#### GREATER THAN $1 BILLION (AOG1)

<table>
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<tr>
<th>Overall Position in whole Sector Mkt Capitalisation</th>
<th>Company</th>
<th>Mkt Cap. $mil 31 Aug 2023</th>
<th>Mkt Cap. $mil 31 Aug 2022</th>
<th>% Change in Mkt Cap</th>
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<td>Origin Energy</td>
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Total AOG1 change: 115,109 to 105,079 = 3.9%

#### GREATER THAN $100 MILLION (AOG2)

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<th>Mkt Cap. $mil 31 Aug 2022</th>
<th>% Change in Mkt Cap</th>
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<tbody>
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<td>PCL 2</td>
<td>Pancontinental Oil</td>
<td>137</td>
<td>46</td>
<td>199%</td>
</tr>
<tr>
<td>MAY 8</td>
<td>Melbana</td>
<td>253</td>
<td>131</td>
<td>92%</td>
</tr>
<tr>
<td>STX 10</td>
<td>Strike Energy</td>
<td>976</td>
<td>624</td>
<td>59%</td>
</tr>
<tr>
<td>TPD 11</td>
<td>Talon Energy</td>
<td>124</td>
<td>82</td>
<td>52%</td>
</tr>
<tr>
<td>HZN 21</td>
<td>Horizon Oil</td>
<td>259</td>
<td>216</td>
<td>20%</td>
</tr>
<tr>
<td>CYN 28</td>
<td>Carnarvon Petroleum</td>
<td>288</td>
<td>270</td>
<td>7%</td>
</tr>
<tr>
<td>TBN 32</td>
<td>Tamboran Resources</td>
<td>238</td>
<td>247</td>
<td>-4%</td>
</tr>
<tr>
<td>COI 35</td>
<td>Comet Ridge</td>
<td>172</td>
<td>187</td>
<td>-8%</td>
</tr>
<tr>
<td>BBE 44</td>
<td>88 Energy</td>
<td>124</td>
<td>156</td>
<td>-21%</td>
</tr>
<tr>
<td>EGG 47</td>
<td>Empire Energy</td>
<td>112</td>
<td>147</td>
<td>-24%</td>
</tr>
<tr>
<td>IVZ 48</td>
<td>Invictus Energy</td>
<td>202</td>
<td>272</td>
<td>-29%</td>
</tr>
<tr>
<td>HEB 50</td>
<td>Helios Energy</td>
<td>154</td>
<td>219</td>
<td>-30%</td>
</tr>
<tr>
<td>COE 58</td>
<td>Cooper Energy</td>
<td>315</td>
<td>513</td>
<td>-38%</td>
</tr>
</tbody>
</table>

Total AOG2 change: 3,353 to 3,110 = 8%

#### GREATER THAN $10 MILLION (AOG3)

<table>
<thead>
<tr>
<th>Overall Position in whole Sector Mkt Capitalisation</th>
<th>Company</th>
<th>Mkt Cap. $mil 31 Aug 2023</th>
<th>Mkt Cap. $mil 31 Aug 2022</th>
<th>% Change in Mkt Cap</th>
</tr>
</thead>
<tbody>
<tr>
<td>JFR 1</td>
<td>Jupiter Energy</td>
<td>22</td>
<td>3</td>
<td>50%</td>
</tr>
<tr>
<td>PGY 4</td>
<td>Pilot Energy</td>
<td>34</td>
<td>13</td>
<td>153%</td>
</tr>
<tr>
<td>NGY 5</td>
<td>NuEnergy</td>
<td>59</td>
<td>25</td>
<td>135%</td>
</tr>
<tr>
<td>KKO 6</td>
<td>Kinetic Energy</td>
<td>94</td>
<td>44</td>
<td>113%</td>
</tr>
<tr>
<td>NHE 7</td>
<td>Noble Helium</td>
<td>72</td>
<td>35</td>
<td>105%</td>
</tr>
<tr>
<td>BAS 9</td>
<td>Bass Strait Oil Co</td>
<td>30</td>
<td>16</td>
<td>61%</td>
</tr>
<tr>
<td>OEL 13</td>
<td>Otto Energy</td>
<td>91</td>
<td>62</td>
<td>46%</td>
</tr>
<tr>
<td>TEG 15</td>
<td>Triangle Energy</td>
<td>29</td>
<td>22</td>
<td>34%</td>
</tr>
<tr>
<td>ADX 16</td>
<td>ADX Energy</td>
<td>33</td>
<td>25</td>
<td>29%</td>
</tr>
<tr>
<td>LKO 18</td>
<td>Lakes Oil</td>
<td>58</td>
<td>47</td>
<td>24%</td>
</tr>
<tr>
<td>ROG 20</td>
<td>Red Sky Energy</td>
<td>32</td>
<td>27</td>
<td>20%</td>
</tr>
<tr>
<td>BRX 22</td>
<td>Brookside Energy</td>
<td>63</td>
<td>55</td>
<td>15%</td>
</tr>
<tr>
<td>TDO 26</td>
<td>3D Oil</td>
<td>14</td>
<td>14</td>
<td>0%</td>
</tr>
<tr>
<td>NZO 29</td>
<td>New Zealand Oil &amp; Gas</td>
<td>85</td>
<td>86</td>
<td>-1%</td>
</tr>
</tbody>
</table>

#### LESS THAN $10 MILLION (AOG4)

<table>
<thead>
<tr>
<th>Overall Position in whole Sector Mkt Capitalisation</th>
<th>Company</th>
<th>Mkt Cap. $mil 31 Aug 2023</th>
<th>Mkt Cap. $mil 31 Aug 2022</th>
<th>% Change in Mkt Cap</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLV 14</td>
<td>Global Oil &amp; Gas</td>
<td>6</td>
<td>4</td>
<td>35%</td>
</tr>
<tr>
<td>BUY 17</td>
<td>Bounty Oil &amp; Gas</td>
<td>10</td>
<td>8</td>
<td>25%</td>
</tr>
<tr>
<td>IPB 19</td>
<td>IPB Petroleum</td>
<td>5</td>
<td>4</td>
<td>24%</td>
</tr>
<tr>
<td>WBE 23</td>
<td>Whitebark Energy</td>
<td>7</td>
<td>6</td>
<td>13%</td>
</tr>
<tr>
<td>PRM 37</td>
<td>Prominence Energy</td>
<td>2</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>ICN 49</td>
<td>Icon Energy</td>
<td>4</td>
<td>5</td>
<td>-29%</td>
</tr>
<tr>
<td>LIO 50</td>
<td>Lion Energy</td>
<td>10</td>
<td>16</td>
<td>-37%</td>
</tr>
<tr>
<td>XST 62</td>
<td>Xstate Resources</td>
<td>4</td>
<td>6</td>
<td>40%</td>
</tr>
<tr>
<td>EMP 66</td>
<td>Emperor energy</td>
<td>3</td>
<td>7</td>
<td>188%</td>
</tr>
<tr>
<td>KEY 67</td>
<td>Key Petroleum</td>
<td>2</td>
<td>4</td>
<td>-50%</td>
</tr>
<tr>
<td>GGR 69</td>
<td>Gas2Grid</td>
<td>4</td>
<td>8</td>
<td>-50%</td>
</tr>
<tr>
<td>SGC 69</td>
<td>Sargasco</td>
<td>4</td>
<td>8</td>
<td>-51%</td>
</tr>
<tr>
<td>BME 72</td>
<td>Black Mountain Energy</td>
<td>4</td>
<td>11</td>
<td>-65%</td>
</tr>
<tr>
<td>WEL 75</td>
<td>Winchester Energy</td>
<td>2</td>
<td>10</td>
<td>-80%</td>
</tr>
<tr>
<td>AXP 76</td>
<td>AXP Energy</td>
<td>6</td>
<td>31</td>
<td>-81%</td>
</tr>
</tbody>
</table>

Total AOG4 change: 72 to 131 = -45%

OVERALL TOTAL: 120,359 to 111,317 = 8%

Source: AOGR

In AOG2 (market caps greater than $100 million and less than $1 billion) the numbers were less no less flattering revealing a market cap expansion of 8%. Pancontinental (199%) Melbana (92%), Strike Energy (56%), Talon Energy (52%), Horizon Oil (20%) and Carnarvon (7%) pulled the carriages along nicely with gleaming market cap deliverables keeping their stock holders purring. Further down the food chain into the gloomier disposition of AOG 3 (market caps of $10-$100 million) and casualties were mostly in the red with a 17% overall fall in market cap value. Nevertheless, 17 of the 41 companies in this category were buoyant enough to keep their head above water and flexed market cap muscles for the period to deliver growth ranging from 563% (Jupiter Energy) to 2% (3D Oil).

Moving into AOG4 (market caps less than $10 million) and most of the minnows had endured a tough 12 months by implying 45% overall, albeit with four shining lights in a sea of darkness; Global Oil and Gas, which grew 35%, Bounty Oil and Gas (25%), IPB Petroleum (24%) and Whitebark Energy (13%) revealing a healthier disposition that their struggling peers.

**DALE GRANGER**
JON COCKER PADDLES IN AS WINNER OF THE BARRY GOLDSTEIN MEDAL

South Australia PESA member and Beach Energy Manager of Geophysics Jon Cocker has been named winner of the Barry Goldstein Medal for Innovation, Collaboration and Communication in Geoscience for outstanding creativity in the field of onshore seismic survey initiatives which reduced land clearing to zero while also improving data quality.

If Barry Goldstein was still alive, you can bet he would have purred like a Cheshire cat at the new approach to acquiring seismic data which was conceived by Jon and implemented by the Beach team and joint venture partner, Cooper Energy, at the Dombey 3D Geophysical Survey near Penola in the Otway Basin. The survey, which took place in early 2022, identified future gas reserves to be drilled and connected back to the Katnook Gas Processing Facility and was designed to eradicate the need to clear native vegetation and to minimise, or avoid, clearing forestry.

PESA’s Federal Membership Committee were the adjudicators who declared Jon the inaugural winner of the award, a third accolade for the Beach Energy man, an avid surfer who also received a South Australian Premier’s Award last year for the initiative.

Beach Energy is targeting a 35% reduction in equity emissions intensity from its operations by 2030 and as part of this transformative journey, Jon rose to the occasion by deploying a unique combination of technologies and procedures during the Dombey Survey.

The low-impact survey method meant there was minimal impact to landholders, no disturbance to properties, reduced land clearing from as much as 150 Ha down to zero, while yielding improved data quality and lower costs.

The flow-on effects for the native habitats of local wildlife, including red-tailed black cockatoos, were priceless.

Jon’s innovation was acknowledged by PESA as a “demonstration of an innovative approach, method, or invention to progress geoscience understanding and/or solve geoscientific problems”.

Jon was required to demonstrate communication and collaboration skills of the highest order to deliver innovations challenged by: the enabling of vibroseis acquisition on existing tracks and fence lines while using hand-carried nodes to record the data. Success in this endeavour limited the need to clear native vegetation, in the process better protecting local wildlife habitats.

The 165km² survey area included farms and active plantation forest involving 17 landholders. A typical approach to acquiring a seismic survey over this area would have required approximately 1300km of vehicle access on a 250m x 250m regular grid and up to 500Ha of land clearing on a track width of 4m, depending on the amount of existing access.

The survey subsequently set out to eliminate the need to clear any native vegetation and minimise or avoid clearing any forestry. The ability to acquire data while forestry operations were in progress was seen as a significant challenge considering that the sensors used in seismic surveys are extremely sensitive. Standard surveys are often shut down due to noisy winds, let alone large machinery used to cut down trees which would render their task impossible.

Complicating matters was the Beach and JV partner Cooper would likely only have one shot at the seismic operation, leaving no margin for error.

Successful implementation required the collaboration of Terrex Seismic, the acquisition contractor, and VelSeis, the seismic processing contractor.

Terrex had to buy into the strategy for the placement of 30,000 vibration
sensors in the field, the development of metadata assigned to enable efficient handling of data and allowing for optimum separation of overlapping data.

In field logistics were required to handle significant data volumes in excess of 100TBytes.

VelSeis’s collaboration entailed the development and testing of separate overlapping data and the development of methodologies to handle the extremely large dataset.

Prior to the project, each company was briefed on the gameplan as part of the tender process to ascertain their willingness and ability to provide, or develop, the required technology to enable the new approach. Once awarded, numerous web-based discussions and meetings were held as part of the cooperative process.

While Jon’s new system will reduce land clearing for all future seismic surveys and deliver improved data quality, the innovation also enables unalised wavefield sampling and improved near-offset coverage through simultaneous recording of data into multiple tuned receiver patches. Each of the grids is interleaved in such a way that the combined grid creates a multifocal sensing array, with each grid acting like an antenna concentrating on different signal and noise patterns. The equipment, parameters, dimensions and interleaving relationship of each sensor patch are tuned to the characteristics of the expected signal, noise and bandwidth of the data. The innovative design doubled the area that could be covered by sensors from 60 to 120km². This enhanced cost savings and a reduction in the interruption of farming and forestry activities.

The design was hailed for providing a significant improvement in near-offset sampling to enable effective source generated noise attenuation and reduced sampling requirements at further offsets (distances), resulting in a significant reduction in the amount of equipment required.

Jon, however, has a few arrows in his quiver.

**APPEA AWARD**

While the Dombey 3D seismic program was in the process of being designed and acquired, Jon was multitasking and kept very busy simultaneously designing the Prion Seismic Survey for the offshore Bass Basin – an initiative which won the APPEA Environment Award for 2021. Jon surfaced from this absorption having designed both the seismic survey and the Alternative Technology Trial, a nation-leading research project to improve the evidence base of new seismic technologies. These include new sound sources for seismic surveys, which had been tested in lakes and water tanks and demonstrated lower peak sound pressure levels than conventional technologies. However, there was little field trial data from these technologies in open oceanic waters and Jon is closing the research gap.

The key to the innovation is the implementation of multi-focal sensor arrays combined with several new technologies to enable fully irregular source sampling. Moving away from the standard implementation, which uses regular and orthogonal source and sensor sampling, to fully irregular source sampling allows maximum use at a predetermined rate to create sound waves with reduced high frequency components that are perceived to have the most potential for disturbing marine life.

The new technologies were trialled on the eastern boundary of the Prion Survey and the data obtained is in the process of being compared to the conventional seismic method used for the Prion Survey to establish its effectiveness.

Jon was instrumental in a genuine consultation process with the fishing sector, which led to a major collaborative research project valued at $3.7m, with financial and in-kind support from Beach, IMAS, Curtin University, Fisheries Research and Development Corporation (FRDC) and the Department of Primary Industries, Parks, Water and Environment, Tasmania (DPIPWE). The collaboration aspect of the study was to assess scallop biomass and conduct a ‘before and after’ impact study on potential new scallop beds in a small part in the south-west corner of the Prion Survey area.
The South Australian branch’s regular monthly lunchtime meetings continue with a smorgasbord of topics which are highly recommended for other branches and webinars.

July – Jon Cocker, Geophysics Manager at Beach, presented his AEGC paper titled “A seismic source field trial in the Bass Strait: Testing the impact of several different source configurations on geophysical quality, received sound, and direct impact on scallops and lobsters.” Jon is the inaugural winner of the Barry Goldstein Medal for Innovation, Collaboration and Communication in Geoscience and the presentation demonstrated how all these elements were present in a trial offshore seismic test of various sources and arrays and their impact not on just the seismic data quality but also the environment. A fascinating approach to environmental positive new seismic acquisition parameters.

August – Dr Bronwyn Camac, (Acting) Director of the Geological Survey of South Australia (and current Immediate Past President of PESA), presented a fascinating talk on the space where the mineral resource industry and the energy resource industry collide. The single most disruptive event of the last 150 years is being addressed in all countries to drive our economies toward net-zero carbon emission. To support net-zero targets, the market is moving towards new technologies, such as electric vehicles, renewable technologies, space technology, telecommunication and defence. All of these technologies need critical minerals. Dr Camac reviewed South Australia’s rich endowment of these minerals and showed how the state will play a major role in the energy transition.

September – Dr Chris Cubitt, Deputy Director at the South Australian Department for Energy and Mining, presented his APPEA paper titled “Cretaceous depositional environment interpretation of offshore Otway Basin cores and wireline logs; application to the generation of basin-scale gross depositional environment maps.”

Chris creatively showed how ground truthing well and seismic data from the onshore Otway could be extended to the deep water, frontier part of the basin. He discussed how the integration of well and seismic observations lead to the compilation of a basin-wide regional gross depositional environment map for the Sherbrook Sandstone.

This map indicated the distribution of Sherbrook play elements such as source rock, seal and reservoir, especially across the Deep Water Otway Basin where well data is sparse.
SEVENTEEN geoscientists gathered at the Terrace Hotel in Adelaide on the 21st of August for a 5-day structural geology course presented by Professor Ken McClay.

Ken is a world-renowned structural geologist with extensive field experience across all types of structural terranes and he focusses closely on the integration of field studies, analogue models, seismic interpretation and remote-sensing in order to develop 4D evolutionary models for fault and fold systems in sedimentary basins.

In addition to authoring and co-authoring an impressive number of research papers, Ken has edited five volumes on thrust tectonics and one on passive margins. He is also the author of a widely-used guide to the field mapping of geological structures.

The overarching aim of the course was to provide a comprehensive overview of modern concepts of structural geology and then to emphasise how to apply this knowledge to hydrocarbon exploration and production, and particularly to the interpretation of 2D and 3D seismic data.

Ken used an impressive array of field examples, remote sensing images, analogue models, seismic sections and conceptual models to examine the formation and evolution of extensional, inverted, strike-slip and thrust-fault systems before unleashing the participants to practice their newly-learnt skills on a range of seismic data examples from around the world.

This course is highly recommended as something other branches should consider sponsoring.
PESA-ASEG 36th Annual Golf Classic Tees Up at The Vines

T’S one of the best attended events on the PESA WA Branch Calendar and this year the Annual Golf Classic is back with a bang and a birdie, plus a few bogeys no doubt, at the Vines Golf Club in the Swan Valley.

Recent golf days have attracted in excess of 100 players and this year the field in the PESA-ASEG Golf Classic will tee off on Friday 24 November at one of the finest golf courses in WA that hosted the world famous Johnny Walker Classic some years ago.

The Vines Resort is surrounded by native bush with abundant wildlife, lush manicured gardens and the magnificent Swan Valley wine region. Some may recall the challenge and beauty of this course from recent years of the PESA-ASEG Golf Classic.

After the charity success from previous years, PESA-ASEG has decided to partner again with our charity of choice, Parkerville Children and Youth Care. The charity is a 115-year-old non-for-profit organisation, based here in WA. With 1/4 girls and 1/6 boys affected by child abuse and trauma by the age of 18, Parkerville has a huge role within our community; to raise awareness of child abuse, provide services for those in need and grow the network of support in providing a future for our WA children, young people, and families. As a proud supporter of the charity, we will run the day to raise as many funds as possible and are inviting your company to take part in it. There will be a silent auction, competitions, prizes, and raffle.

ZAC McCARREY | WA VICE PRESIDENT & YP CHAIR

WINTER WARMER WAS WELL ATTENDED

THE Western Australian PESA members gathered recently for their annual Winter Warmer.

This year marked the return of the event at WA Museum Boorla Bardip, occupying a space outside the Wild Life exhibit. This exhibit walks you through the different Western Australian animals, flora and fauna but most importantly a brief walk-through geological time and Western Australian creatures of the past.

The event was well attended with nearly 100 people coming to the event and it was great to meet some PESA Members partners.

A big thank you goes out to Ikon Science for sponsoring the event. We are not able to host events like this without generous donations from sponsors.

Also, thank you to the following companies for donating a door prize: Rock Flow Dynamics (RFD), Molyneux Advisors, Devil Resources, HiSeis, ImageStrat & The Hilton.

ITINERARY:

Teams of 4 will play ambrose rules and mystery hole handicap weighting’s applied. The schedule for the day will be as follows:

From 7:30am: Registration and allocating of players to carts - cart labels with individual names;

8:10–9:00am: Chipping competition;

8:45–9:20am: Breakfast prior to start;

9:20am: Briefing from pro shop staff;

9:30am: Shotgun start with escort to appropriate holes;

2:00pm: Approximate finish;

2:00–5.00pm: Drinks from bar and BBQ on the terrace.

TICKET PRICES:

Member (ASEG or PESA): $160
Non-Member: $210

Book now to avoid disappointment as tickets are strictly limited.

Teams of 4 should be registered as 4 players by the same person.

Teams can be a named team captain plus players TBC. Please contact wa-secretary@pesa.com.au to confirm names once these are known.

REFUND POLICY: Refunds are only applicable if notified in writing to wa-secretary@pesa.com.au prior to the close of ticket sales.
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Petroleum exploration activity in Australia decreased in 2022. The total number of exploration wells drilled and expenditure across Federal offshore and state jurisdictions decreased from 2021 levels. The number of exploration permits awarded and acreage made available for exploration was also lower than that of 2021. However, more appraisal wells were drilled in 2022. Onshore exploration expenditure in Australia has exceeded that of the offshore since 2019 and remains the focus of exploration activity. Exploration activity and expenditure has not followed the increase in oil and gas prices of recent years, suggesting external factors are suppressing and impeding exploration activity.

Twenty-six exploration wells were drilled in the year compared to 29 in the previous year, resulting in one offshore and eight onshore petroleum discoveries. The Pavo oil discovery in the Bedout Sub-basin and in the same exploration play as the Dorado oil discovery of 2018, was the only offshore discovery in 2022. Onshore exploration ‘hot-spots’ include the Northern Perth Basin and the Cooper – Eromanga Basin. The Permian Kingia Sandstone play of the Northern Perth Basin yielded the South Erregulla and Gynatrix gas discoveries, and the Jurassic Namur Sandstone play of the Cooper – Eromanga ‘Western Flank’ was extended yielding the Bangalee-1, Coorong-1, Magic Beach-1 and Rocky-1 oil discoveries.

Petroleum exploration expenditure for 2022, as reported by the Australian Bureau of Statistics (‘ABS’), remains subdued. Following the COVID pandemic influenced lows of 2020, exploration expenditure had increased in 2021 but has declined in 2022, down 12% to an annual total of A$984 million (Fig. 1).

Onshore exploration spend continues to exceed offshore spend since late-2019. Onshore exploration spend in 2022 was A$597 million, a decrease of 17% from 2021, whilst offshore exploration spend was A$387 million (down 3%).

From petroleum exploration spend highs in 2013-14, spend decreased in line with the oil price decline. However, since 2016, increases in the oil price have not been reflected in increased petroleum exploration expenditure which has remained moderately flat since 2016. Modest spend increases through 2018-19 were terminated by the COVID pandemic in 2020. A recovery in exploration spend in 2021 was reversed in 2022.

Following the oil price crash of 2014, petroleum exploration spend has not dramatically increased as a result of oil price recovery. Notably, exploration spend this year has not responded significantly to increases in the east-coast LNG net-back price (LNG netback price as reported by the Australian Competition & Consumer Commission (‘ACCC’), refer ACCC (2023)) or domestic east-coast domestic gas prices.
Petroleum exploration spend in Australia is approximately one-quarter of the minerals exploration spend and this trend is expected to continue with increased focus on ‘energy transition’ critical minerals.

Like previous years, Government funded petroleum exploration incentive programs have been made available in an effort to stimulate petroleum exploration and development in Australia.

Collaborative funding schemes were available in the states of Queensland, the Northern Territory, and Western Australia in 2022. The Commonwealth Government funded Beetaloo Collaborative Drilling Program for the period 2021-2023 closed in mid-2022.

Notably, all of these programs are only for onshore petroleum exploration alone.

The total area under petroleum title in Australia continued to decline in 2022 (Fig. 2). Total area under exploration title has decreased 46% since 2015.

Over the same period offshore exploration title area has decreased 64% (on average 9% per annum) and onshore exploration title area has decreased 37% (on average 5% per annum). Fourteen Federal waters offshore exploration permit titles were surrendered in 2022.

**Fig. 1:** Quarterly petroleum exploration expenditure 2013 - 2022 in comparison to minerals exploration spend (ABS, 2023) against Brent oil price and LNG netback price (ACCC, 2023).

**Fig. 2:** Area under petroleum title 2016 - 2022.

**Fig. 3:** Federal offshore release round permit award analysis 2004 - 2022.
Analysis of acreage bids and awards for Federal offshore release rounds shows that there has been a general trend of decreasing annual exploration title awards since a peak in 2007 (Fig. 3). However, there has been an increase in the number of firm exploration wells included in the winning work program bids and consequently the average commitment spend. It is worth noting that seismic commitments have been decreasing and that 2D seismic acquisition has not been a feature of work program bids since 2019.

**EXPLORATION ACREAGE RELEASE ROUNDS**

Exploration acreage was released for bidding in offshore areas as part of the annual Federal offshore release round as well as onshore and offshore areas of Western Australia as part of the state release (Fig. 4).

Ten release areas were included in the Federal offshore release round which was announced in August rather than June as a result of the Federal election held in May and the subsequent change of government. However, the bid closing date remained per prior releases as early March (2023).

The number of release areas included in each annual Federal offshore release round has been decreasing, from a peak of 64 areas in 2019, to 42 in 2020, 21 in 2021 and to 10 for 2022. No cash bid release areas have been included in a release round since 2019.

Eight release areas were included in the Western Australian release round, with one area in Territorial waters in the Carnarvon Basin, three onshore Carnarvon Basin areas and four areas in the western Amadeus Basin.

A Federal offshore greenhouse gas (‘GHG’) acreage release was anticipated in late 2022 as in 2021, following the acreage nominations process held within the year. However, the release did not eventuate.

**PETROLEUM EXPLORATION ACREAGE AWARDS**

There was a total of 13 petroleum exploration permits awarded in Australia in 2022, a summary of which is presented in Fig. 5.

Four exploration permits were awarded in Federal offshore waters, three were from the 2020 acreage release and one was from the 2019 release round (VIC/P80). Two of the four permits awarded in Federal offshore waters contained firm drilling commitments in Years 1–3 of the guaranteed work program.

From the 2020 Federal offshore petroleum acreage release, AC/P70 (ex AC20-4) in the Vulcan Sub-basin was awarded to Melbana Energy with a firm Year 1–3 work program consisting of multiclent 3D seismic acquisition and the drilling of an exploration well. WA-551-P (ex W20-11) in the Beagle Sub-basin was awarded to BP Developments Australia with a firm Year 1–3 work program consisting of 1,000 square kilometres of 3D seismic acquisition, and VIC/P79 (ex V20-1) was awarded to 3D Oil (with ConocoPhillips subsequently farming-in) with a firm Year 1-3 work program consisting of seismic reprocessing and one exploration well. VIC/P80 (ex V19-5) from the 2019 release round
Fig. 5: Summary of petroleum exploration permit awards in 2022.

Fig. 6: Summary of greenhouse gas storage assessment permit awards in 2022.
was awarded to Cooper Energy with a firm Year 1–3 work program consisting of multiclient 3D seismic acquisition/licensing.

Like the Federal offshore permit awards, the permits awarded in the state jurisdictions also attracted significant work programs. One permit was awarded onshore Carnarvon Basin in Western Australia, three were awarded in South Australia and five in Queensland. Four of the permits awarded in Queensland are coal seam gas exploration permits in the Bowen and Surat Basins, with one (ATP 2071) subject to domestic supply obligations. One of the permits awarded in South Australia (PEL 691) was awarded to H2Ex Ltd on the Eyre Peninsula for the exploration of naturally occurring hydrogen.

GREENHOUSE GAS STORAGE ASSESSMENT PERMIT AWARDS

Five Federal offshore greenhouse gas (‘GHG’) assessment permits were awarded in 2022 following the 2021 GHG acreage release (Fig. 6). G-7-AP (ex GHG21-1) in the Petrel Sub-basin was awarded to a Joint Venture of INPEX, Total and Woodside with a firm Year 1–3 work program consisting of 3D seismic acquisition and the drilling of two wells. Also in the Petrel Sub-basin, G-11-AP (ex GHG21-2) was awarded to a Joint Venture of Santos, Chevron and PRISM with a firm Year 1–3 work program consisting of 3D seismic acquisition and the drilling of a well. G-8-AP (ex GHG21-3) in the Browse Basin was awarded to Woodside, G-10-AP (ex GHG21-4) in

![Fig. 7: GHG assessment and petroleum exploration permit awards work program details.](image-url)

<table>
<thead>
<tr>
<th>Discretionary spend (A$MM)</th>
<th>Discretionary wells</th>
<th>Firm spend (A$ MM)</th>
<th>Firm wells</th>
<th>Permits</th>
</tr>
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<tr>
<td>Petroleum permits</td>
<td>115.8</td>
<td>3</td>
<td>70.8</td>
<td>2</td>
</tr>
<tr>
<td>GHG permits</td>
<td>128.1</td>
<td>2</td>
<td>271.0</td>
<td>3</td>
</tr>
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the Carnarvon Basin was awarded to the NW Shelf Joint Venture and G-9-AP (ex GHG21-5), also in the Carnarvon Basin, was awarded to Santos and Chevron.

**FEDERAL OFFSHORE PETROLEUM EXPLORATION VS GHG AWARDS**

Analysis of the winning work program bids for Federal offshore GHG assessment permits and petroleum exploration permits shows that GHG assessment permit awards are attracting more significant work programs than petroleum exploration permits, including the number of firm wells (Fig. 7).

GHG assessment permits in comparison to the petroleum exploration permit awards are dominated by major international petroleum companies with Australian projects, where the petroleum exploration permits are awarded to small ASX listed companies – except for the award of WA-551-P to BP Developments Australia.

Curiously, it has taken far longer to award Federal offshore petroleum exploration permits than GHG assessment permits. This is according to publicly available information in the National Offshore Petroleum Titles Administrator (‘NOPTA’) National Electronic Approvals Tracking System (‘NEATS’) online portal. This duration of time, from bid application lodgement to official award, includes the screening, assessment, decision and implementation processes. The author acknowledges that the GHG assessment awards were made following a change of Federal Government in mid-2022, whilst the petroleum exploration awards were made under the prior Government.

**SURVEYS**

Some 2,384 square kilometres of 3D seismic and 2,384 line kilometres of 2D seismic were acquired in Australia in 2022 (Fig. 8).

Marine 3D surveys were acquired in the Bedout Sub-basin of the Northern Carnarvon Basin (Keraudren Extension Phase II) and Petrel Sub-basin (Petrel Sub-basin SW 3D). A significant marine 2D program (Galactic Hybrid survey, 4,112 line km) was acquired by Woodside in the NT/P86 permit. Acquired marine 3D survey square kilometres in 2022 was approximately a third of 2021 acquisition.

The Northern Perth Basin was a focus of seismic acquisition in 2022, with the acquisition of the Bookara and Rococo 3D surveys, and the Barberton, Charger and Ringneck 2D surveys. Onshore 3D acquisition increased significantly in 2022 (260%) over 2021, whereas 2D acquisition decreased approximately 50%.

**EXPLORATION DRILLING**

Twenty-six exploration wells were drilled in Australia in 2022 compared to 29 in 2021, 25 in 2020 and 20 in 2019. Five offshore exploration wells were drilled compared to three in 2021 (Fig. 9).

The Pavo-1 exploration well drilled in the WA-438-P exploration permit in the Bedout Sub-basin by the Santos and Carnarvon Energy joint venture yielded the only offshore (oil) discovery. Of the 21 exploration wells drilled
**Fig. 10:** Location map and Pavo – Pavo South top Caley Member depth structure map (modified from Carnarvon Energy, 2022d).

**Fig. 11:** Pavo seismic inversion section (upper) and schematic section (lower). Modified from Carnarvon Energy (2021, 2022d). Refer Fig. 8 for locations.
onshore, there were eight discoveries; Bangalee-1, Coorong-1, Magic Beach-1, Nungeroo West-1 and Rocky-1 in the Cooper - Eromanga Basin, Gynatrix-1 and South Erregulla-1 in the Northern Perth Basin, and a Palm Valley-12 objective in the Amadeus Basin.

EXPLORATION RESULTS

Following the 2018 exploration success at Dorado, the Santos and Carnarvon Energy joint venture drilled the Pavo-1 well in WA-437-P and Apus-1 in WA-438-P in 2022. Apus-1 was plugged and abandoned as a dry-hole, but Pavo-1, drilled to a total depth of 3,600m, intersected a gross 60m 52° API oil column with net pay of 46 m in sandstones of the Triassic Caley Member of the Archer Formation with an average porosity of 19% (Carnarvon, 2022a). Pavo shares similar trapping geometry to the Dorado discovery, being a four-way dip closed structure enhanced by post-depositional erosion and Triassic reservoir sub-crop (Fig. 10 and Fig. 11).

The Pavo discovery is reported to contain gross 2C Resources of 43 MMbbl with a prospective southern extension (Pavo South) assessed as being 66 MMbbl (2U, gross) and 51% probability of geological success (Carnarvon Energy, 2022b).

Offshore exploration wells that failed to intersect hydrocarbons are the Dancer-1 well in the WA-1-P exploration permit (Santos) of the Dampier Sub-basin, Kanga-1 well in the WA-412-P exploration permit (SapuraOMV and Finder Energy) on the north-eastern extremities of the Rankin Platform and the Sasanof-1 well in the WA-519-P exploration permit on the Exmouth Plateau (Fig. 9).

Sasanof-1 was drilled to test a large seismic amplitude defined combination structural – stratigraphic trap at the Cretaceous Barrow Group objective. The well was drilled to a total depth of 2,390 m in 1,070 m water depth. Prominence Energy and Global Oil and Gas had farmed into the well, paying a 2:1 promote on the well costs.

A number of exploration wells were drilled in the onshore Northern Perth Basin in 2022. The Cervantes-1 exploration well was drilled in the L14 (Jingemia) production license by RCMA with Metgasco and Vintage Energy farming into the drilling of the well, South Erregulla-1 was drilled in the EP 503 exploration permit (Strike Energy) and the Mitsui and Beach Energy Waitsia joint venture drilled the Elegans-1 and Gynatrix-1 exploration wells in the L2 and L1 production licenses respectively (Fig. 10 and Fig. 11).

Cervantes-1 was drilled to test a fault dependent and three-way dip-closed trap with Permian Kingia Sandstone objective. The well failed to intersect hydrocarbons and failure is attributed to poor access to oil charge. Elegans-1 also failed to intersect hydrocarbons. However, the South Erregulla-1 and Gynatrix-1 wells resulted in gas discoveries within the Permian Kingia Sandstone objectives.

South Erregulla-1 intersected a 52m gross gas column (14 m net) in the Kingia Sandstone with porosities up to 20% (Strike Energy, 2022a). A 16 m net gas column was also intersected in the overlying late Permian Wagina Sandstone with porosities up to 14% (Strike Energy, 2022b). The South Erregulla Kingia Sandstone depth structure is mapped as a southerly extension of the West Erregulla field in EP 469. A production test of the Kingia Sandstone interval yielded rates of 80 MMscf/d (Strike Energy, 2022c).

Gynatrix-1 intersected a 6m net gas column across a 37m gross interval in the Kingia Sandstone (Beach Energy, 2023). Gynatrix is mapped as a separate fault compartment and south-westerly extension of the Waitsia gas field.

Thirteen exploration wells were drilled in the Cooper – Eromanga Basin which yielded 5 discoveries; Magic Beach-1, Bangalee-1, Coorong-1, Rocky-1 and Nungeroo West-1. Eleven of the exploration wells were Operated by Beach Energy and drilled on the oil prone ‘Western Flank’ (Fig. 13). The ‘Western Flank’ discoveries were Magic Beach-1 which intersected a 2.7m Namur Formation oil column, Bangalee-1, Coorong-1, Rocky-1 and Nungeroo West-1. Sixteen of the exploration wells were Operated by Beach Energy and drilled on the oil prone ‘Western Flank’ (Fig. 13). The ‘Western Flank’ discoveries were Magic Beach-1 which intersected a 2.7m Namur Formation oil column, Bangalee-1, Coorong-1, Rocky-1 and Nungeroo West-1. The ‘Western Flank’ oil play to the north-west from the established oil producing
fields. Beach attributes success in exploring for these oil accumulations to 3D seismic (re)processing utilising a pre-stack depth migration (‘PSDM’) processing workflow.

Other onshore exploration wells of note include the Carpentaria-4V step-out unconventional Beetaloo Basin exploration well drilled by Empire Energy which intersected the Velkerri Shale A, B and C shale objectives with gas shows.

In the Amadeus Basin, Central Petroleum drilled the Palm Valley-12 well which was originally planned to be deepened to the Arumbera Sandstone exploration objective, but due to drilling difficulties, a sidetrack exploration hole was drilled into the Lower Pacoota Sandstone without intersecting hydrocarbons (Central Petroleum, 2022). The well was completed over an interval of the Upper Pacoota Sandstone and production tested.

**APPRAISAL DRILLING**

Thirty-nine appraisal wells were drilled in 2022, with all wells drilled onshore. This compares to the 31 appraisal wells drilled in 2021. Twenty-three of the 2022 appraisal wells were drilled in the Cooper – Eromanga Basin, nine wells in the Bowen Basin, three wells in the Surat Basin, two wells in the Beetaloo Basin and two wells in the Perth Basin.

Most of the Bowen and Surat Basins wells were coal seam gas appraisal wells except for Wellesley-2 drilled by Lakes Blue Energy in the ATP 1183 exploration permit, Surat Basin.

Notable appraisal drilling campaigns in the Cooper – Eromanga Basin include the seven wells drilled by Beach Energy on the Martlet field and three wells drilled by Santos on the Ragno field. All of these appraisal wells being successful.

In the Perth Basin, Strike Energy drilled the Walyering-6 appraisal well in the Walyering field which intersected gas in sands of the Jurassic Cattamarra Coal Measures in addition to discovering a shallower gas bearing interval in the overlying Cadda Formation. Strike Energy also re-entered the West Erregulla-3 well and completed drilling a sidetrack of the original bore-hole into the Permian Kingia Sandstone objective (Fig. 12). The sidetrack intersected a gross gas bearing interval of 60m with 38m of net pay, with an average porosity of 13.8% (Strike Energy, 2022d).

In the Beetaloo Sub-basin of the Northern Territory, two wells were drilled to further delineate and test the Velkerri Shale unconventional play. Empire Energy drilled the Carpentaria-3H well in EP 187 to the north of the original Carpentaria-1 well of 2020. Tamboran Resources drilled the Maverick-1V well in 100% owned EP 136 to the south-west of the Tanumbirini wells in the Santos operated (with Tamboran Resources as joint venture participant) EP 161 permit.

**TRANSACTIONS & FARMIN DEALS**

In addition to the completion of the Woodside and BHP Petroleum merger, a number of acquisitions and farmins occurred in 2022.

The ATP 2044 exploration permit in the Taroom Trough of the Surat Basin and its holding company, EnergyCapture Pty Ltd, were acquired by Elixir Energy (Elixir Energy, 2022). This permit
contains a Permian tight gas play in which Elixir plan to drill and test in 2023. Omega Oil and Gas, which floated on the ASX in October 2022, has exposure to the same exploration play in its nearby ATP 2037 and ATP 2038 permits.


Strike Energy launched a takeover of its West Erregulla joint venture partner Warrego in November 2022 which was followed by takeover offers from Beach Energy and Hancock Energy, with Hancock Energy succeeding and moving to compulsory acquisition in early 2023.

A number of farmins were executed in 2022, with Talon Energy farming-into the newly awarded 3D Oil VIC/P70 exploration permit in the offshore Otway Basin.

Activity in the equity market in 2022 increased over the levels of 2021. Capital raised by ASX listed oil & gas entities increased to A$1.97 billion, or A$861 million if Santos and Woodside are excluded from the analysis (Fig. 14). This latter figure represents entities which are predominantly petroleum exploration focussed but that hold assets in Australia and globally.

Initial public offerings ('IPO’s) of petroleum companies also increased in 2022 with five companies floating on the ASX (compared with two in 2021) which were Finder Energy, Noble Helium, Top End Energy, Omega Oil and Gas and Conrad Asia Energy (Fig. 14).

CONCLUSIONS

After an increase in petroleum exploration activity in 2021 following the 2020 COVID pandemic, it was hoped that this trend would continue into 2022. However, petroleum exploration activity in 2022 decreased with the number of exploration wells and expenditure down from the 2021 levels.

The number of exploration wells drilled in 2022 was less than that of 2021 (26 versus 29 in 2021), however there were more wells drilled offshore compared to 2021 (five versus three in 2021).

In addition, the number of exploration permits awarded decreased in 2022, with four Federal offshore permits awarded (eight in 2021) and nine permits awarded in state jurisdictions (nineteen in 2021).

Further to this, the number of exploration areas released for work program bidding was less than that of 2021, with 10 release areas in the Federal offshore acreage release (21 in 2021) and seven areas in state jurisdictions (10 in 2021).

However, the increasing interest in carbon capture and storage is a noticeable with five Federal offshore GHG assessment permits granted in 2022 with significant work programs and other areas in state jurisdictions being assigned preferred tender status and subject to native title negotiations.

Exploration activity appears to be de-linked from increases in commodity prices (refer Fig. 1) which have typically been exploration stimuli in the past. This suggests that other factors, such as access to acreage, social and environmental, are at play.

Positive indications for petroleum exploration in the coming years include an increase in the number of firm exploration wells in awarded permits work programs, increased activity in the equity market and IPO’s accessing capital for exploration activities.

DATA AVAILABILITY.

Data utilised in this study were obtained from public sources in addition to GPinfo, S&P Global and GlobalData.

CONFLICT OF INTEREST.

The author declares there are no conflicts of interest.
DECLARATION OF FUNDING.
No funding from organisations external to RISC was received for the preparation of this paper.

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Data and information used in the compilation of this paper has been sourced from the aforementioned, combined with information extracted from GPinfo and GlobalData in addition to other publicly available sources.

AUTHOR BIOGRAPHY

Adam Craig is a highly experienced geoscientist with over 30 years’ experience working with Lasmo Oil, WMC Resources, Novus Petroleum, Woodside, Cooper Energy and KUFFPEC prior to joining RISC in 2020. Adam has significant global experience in exploration, appraisal, development and production activities. He is a member of PESA (2021-23 WA branch President), a certified petroleum geologist of the AAPG and a Fellow of the Geological Society.

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https://app.sharelinktechnologies.com/announcement/asx/8f7f9881a444a334edd333147529a8


48 | PESA News | THIRD QUARTER 2023
Oil Jumps to 10-month High as Saudi Arabia Extends Voluntary Cuts

By Jorge Leon | Senior Vice President, Rystad Energy

SAUDI Arabia announced in early September that they will extend the 1 million bpd voluntary cuts in oil production until December 2023.

This is a clear indication that oil prices trump volumes for the Kingdom.

Russia also announced the extension of its voluntary export cuts of 300,000 bpd until the end of the year.

These bullish moves significantly tighten the global oil market and can only result in one thing: higher oil prices worldwide.

The decisions surprised oil markets, and prices reacted strongly and suddenly following the announcements.

ICE Brent front month jumped from $88.5 per barrel to over $90.5 per barrel, the highest price since November 2022.

We are now predicting global liquids demand will surpass supply by around 2.7 million bpd in the further quarter of this year.

The big question is: Are the Saudis worried about global demand in the final quarter of 2023, particularly in China, so that they need to take preempted measures?

Chinese macroeconomic sentiment is a potential downside risk, but our latest mobility indicators do not show an imminent deceleration that could justify such a move by Saudi Arabia.

The impact these cuts will have on inflation and economic policy in the West is hard to predict, but higher oil prices will only increase the likelihood of more fiscal tightening, especially in the US, to curtail inflation.

Western leaders, wary of an oil price spike, could explore import adjustments or open diplomatic discussions to help mitigate the impact and tame inflation.

The extension of this longer cut until December implies a significant shift in our balances.

Moreover, this would lead to the highest semi-annual deficits since the second half of 2021 but with the added pressure of starting from much lower stock levels both for crude and products. ▶
SPENDING on conventional oil & gas exploration is rebounding and expected to top $50 billion this year, the highest since 2019, but operators are still waiting for the results they had hoped for. Rystad Energy research shows that despite the rising investments, discovered volumes are falling to new lows.

Our estimates show that in the first half of 2023, explorers found 2.6 billion barrels of oil equivalent (boe), 42% lower than the first half of 2022 total of 4.5 billion boe. Fifty-five discoveries have been made, compared to 80 in the first six months of last year. This means discoveries in 2023 have averaged 47 million boe, lower than the 56 million boe per discovery for the same period in 2022.

The exploration and production (E&P) industry is in a transitional period, with many companies exercising increased caution and shifting their strategies to target more profitable and geologically better-understood regions. This strategic shift and the failure of several critical high-potential wells are contributing to the precipitous drop.

In the hunt for new resources, exploration companies are prioritising the offshore sector, trying to capitalise on underexplored or frontier areas to unlock new volumes through high-risk, higher-cost offshore developments. The offshore industry accounted for about 95% of exploration spending this year to date but only about two-thirds of discovered volumes.

“Upstream companies are facing a period of uncertainty. They are eager to capitalise on the increased demand for fossil fuels and find additional resources, but recent results have been lackluster. If exploration efforts continue to yield unimpressive results for the remainder of the year, 2023 could be a record-breaker for the wrong
reasons,” says Aatisha Mahajan, vice president of upstream research at Rystad Energy.

WHERE ARE THE RESOURCES?

The continued growth of Guyana’s Stabroek offshore block means the Caribbean country leads the way in discovered volumes, with 603 million boe in 2023. Turkey sits second with 380 million boe, Nigeria with 296 million boe and Namibia with 287 million boe, with the potential for these estimates to grow as we better understand the reserves.

Offshore discoveries are spread relatively evenly between ultra-deepwater, deepwater and shelf finds. However, we expect increased activity in the remainder of 2023, especially in the ultra-deepwater market, with projected growth of 27% versus 2022 in terms of spud wells.

FAILED HIGH-IMPACT WELLS

Our research shows that 31 high-impact wells – designated using our tiering system based on the project’s significance and production potential – are expected to be drilled this year. So far, 13 have been completed, six are ongoing and 12 remain in the pipeline. Only four of the 13 completed wells encountered hydrocarbons, a measly 31% success rate. The results of three wells are not yet disclosed, while the remaining six failed to find any reserves. These failures significantly impact the total discovered resources and greatly contribute to the falling discoveries.

MAJORS CONTINUE TO DRIVE SPENDING

The six majors – ExxonMobil, BP, Shell, TotalEnergies, Eni and Chevron – continue to play a critical role in global exploration, with a prominent share of exploration spending and global conventional discovered volumes. The six companies are expected to spend about $7 billion this year on exploration, about 10% higher than in 2022.

Exploration activity will likely gain momentum in the second half of 2023, with crucial exploration wells planned to be drilled. Our forecasts show that the majors will contribute about 14% of total global exploration spending in the coming months, highlighting their relative significance in an environment where exploration has pivoted to the offshore sector, with an increased focus on frontier regions. These underexplored or virgin regions hold some of the most technically prospective yet-to-be-drilled prospects, with majors playing a vital role in recent years in exploring these areas.

The spending and activity profiles of the majors position them firmly in the market, but national oil companies (NOC) have the most extensive subsurface resource base at their collective disposal. More than half of the projected exploration spending in 2023 will come from NOCs and NOCs with international portfolios (INOC).

However, there may yet be some success to come this year, as only 30% of anticipated wells have been completed, highlighting the magnitude of the remaining activity. Only 23 of the remaining 56 exploration wells are either drilled or are expected to be drilled this year, meaning about 60% are likely to be drilled or postponed until 2024. So, even if 2023 proves unsuccessful, a rebound could be on the cards next year.
North Sea Oil & Gas Industry Booms With Increasing Production & Investments

NORWAY and the UK have overcome recent challenges and are on course to achieve significant milestones due to notable increases in investments, exploration success and production. Solid oil & gas production from the region is also providing indispensable resources to Europe and the rest of the world navigating through the energy transition.

Investments in Norway’s oil & gas industry are expected to reach a record-high of about NOK 225 billion ($21 billion) in 2023. It comes as several key projects have been approved in recent years, driven by the country’s temporary tax regime, which was introduced to incentivize spending on the Norwegian continental shelf.

With an impressive growth rate this year, the total investments in the Norwegian oil & gas industry are projected to surpass the record set in 2013, when total investments reached about NOK 205 billion ($19 billion). The investments in 2023 are expected to reach a new all-time high, and this significant increase in investment would mark a new milestone in the oil & gas sector in Norway.

This increase in investment is a positive development after several lean years in the industry and will be particularly welcomed by the oilfield service sector. This investment in the sector is essential for maintaining a strong service industry while it undergoes a gradual transition towards alternative energy sources.

Despite a decline of almost 15%, from a peak of nearly 4.6 million barrels of oil equivalent per day (boepd) in 2004,
Norwegian oil & gas production is set to rise again. By 2025, production might rise back towards peak levels as a result of increased focus on gas production and new projects in the pipeline. These volumes will be produced with one of the world’s lowest CO₂ footprints and reduce Europe’s dependency on Russian hydrocarbons.

Oil & gas investments in the UK have not recovered in the same way as in Norway. It is expected that 2023 investments will be around 75% lower than 2013, when investment peaked at nearly £18 billion ($22.7 billion). With many developments in the pipeline, however, next year could see the highest number of projects sanctioned in a decade. While three to five projects are sanctioned, on average, in the UK each year, 2024 could see up to 14 new oil & gas fields given the green light.

The three largest projects are Rosebank, Cambo and Clair Phase 3. If these major projects get approved, 2024 could mark the highest sanctioning activity since 2013, with around £9.5 billion ($12 billion) in future investments,” says Sonya Boodoo, senior upstream analyst, Rystad Energy.

Few activity measures are more cyclical than exploration activity. In 2014, 57 new oil & gas exploration wells were drilled in Norway. Only two years later, the count fell to 27 as the oil price collapsed in 2015 and 2016. Activity increased in 2018 and 2019, before falling again in 2020 due to Covid-19 and low oil prices.

This year, the number of exploration wells is expected to reach 35 and is anticipated to grow to 36 next year. It has also been a good year for new discoveries, with similar volumes as last year already uncovered, despite only about half of the planned wells for 2023 being completed to date.

Shearwater will be purring having already been active with 40 08N surveys in the Norwegian North Sea this year.
GEOLOGICAL GEMS THAT SHOULD BE ON YOUR BOOKSHELF

Paul Bouloudas, PESA News’ regular book reviewer, has taken a breather for this edition, but in the absence of Paul’s literary insights, we were able to find the next best thing. BookAuthority*, a world leading site for book recommendations as featured on CNN, Forbes and Inc, has compiled a list of the 20 best-selling geology books of all time. Here they are, listed from 1 to 20, which begs the question: How many have you read and do you have any on your bookshelf? If the answer is none fear not. All of these books are available for purchase in hardback or digital format. See Bookauthority.org for more details.

1 NATIONAL AUDUBON SOCIETY FIELD GUIDE TO ROCKS AND MINERALS – NORTH AMERICA

Featuring nearly 800 full-colour photographs, the National Audubon Society Field Guide to Rocks and Minerals is the perfect companion for any expedition. This portable guide depicts all the important rocks, gems, and minerals – in many variations of colour and crystal form – and the natural environments in which they occur, and includes written descriptions of field marks, similar rocks and minerals, environment, areas of occurrence, and derivation of names. Includes a guide to mineral collecting and a list of rock-forming minerals.

By National Audubon Society
Publisher: Knopf
Publication Date: 12 May 1979
ISBN-10: 1426212828
Print Length: 856 pages (Part of a series)

2 A CRACK IN THE EDGE OF THE WORLD – AMERICA AND THE GREAT CALIFORNIA EARTHQUAKE OF 1906

The international bestselling author of The Professor and the Madman and Krakatoa vividly brings to life the 1906 San Francisco Earthquake that levelled a city symbolic of America’s relentless western expansion. Simon Winchester has fashioned an enthralling and informative informative look at the tumultuous subterranean world that produces earthquakes, the planet’s most sudden and destructive force.

In the early morning hours of April 18, 1906, San Francisco and a string of towns to its north-northwest and the south-southeast were overcome by an enormous shaking that was compounded by the violent shocks of an earthquake, registering 8.25 on the Richter scale. The quake resulted from a rupture in a part of the San Andreas fault, which lies underneath the earth’s surface along the northern coast of California. Lasting little more than a minute, the earthquake wrecked 490 blocks, toppled a total of 25,000 buildings, broke open gas mains, cut off electric power lines throughout the Bay area, and effectively destroyed the gold rush capital that had stood for a half century.

Perhaps more significant than the tremors and rumbling, which affected a swatch of California more than 200 miles long, were the fires that engulfed the city for three days. The human tragedy included the deaths of over 700 people, with more than 250,000 left homeless. It was perhaps the worst natural disaster in the history of the United States.

Simon Winchester brings his inimitable storytelling abilities – as well as his unique understanding of geology – to this extraordinary event, exploring not only what happened in northern California in 1906 but what we have learned since about the geological underpinnings that caused the earthquake in the first place. But his achievement is even greater: he positions the quake’s significance along...
the earth’s geological timeline and shows the effect it had on the rest of 20th century California and American history.

A Crack in the Edge of the World is the definitive account of the San Francisco earthquake. It is also a fascinating exploration of a legendary event that changed the way we look at the planet on which we live.

Publisher: Harper
Publication Date: 4 October 2005
ISBN-10: 0060571993
Print Length: 480 pages

3 ROCKS AND MINERALS OF NORTH AMERICA
(BEST SELLER IN THE ROCKS & MINERAL FIELD GUIDES CATEGORY)

This basic beginner’s field guide to North American geology helps anyone identify common rocks, minerals, gems, fossils, and land formations. In a logical, user-friendly, highly visual format, this new title – one of an expanding collection of National Geographic pocket guides – offers key facts about dozens of rocks and minerals, how to hunt and identify them, where and how to go looking. The book also pictures and explains the fossils most likely to be found and the fundamental land and rock formations in the North American landscape. With 160 entries, formatted with clear language, key identification points, carefully chosen photographs, and expertly drafted illustrations, this guide is the perfect starting point for anyone, young or old, interested in the study of rocks and geology.

By Sarah Garlick
Publisher: National Geographic
Publication Date: 1 April 2014
ISBN-10: 1426212828
Print Length: 184 pages

4 FROM MINERALOGY TO GEOLOGY - THE FOUNDATIONS OF A SCIENCE, 1650-1830
(SCIENCE & ITS CONCEPTUAL FOUNDATIONS SERIES)

“A fine treatment of this critical time in geology’s history. Although it goes against our standard histories of the field, Laudan defends her views convincingly. Her style is direct, with carefully reasoned personal opinions and interpretations clearly defined.”
– Jere H. Lipps, The Scientist


Publisher: University of Chicago Press
Publication Date: 6 July 1987
ISBN-10: 0226469506
Print Length: 285 pages

5 THE TESTIMONY OF THE ROCKS - OR, GEOLOGY IN ITS BEARINGS ON THE TWO THEOLOGIES, NATURAL AND REVEALED

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By Hugh Miller
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ROUNDING OUT THE TOP 20 WERE:

The oil & gas sector lauded the Commonwealth for opening up new areas of Australia to explore for suitable carbon capture, utilisation and storage (CCUS) sites which APPEA said would help reduce emissions and create jobs in a growing sector.

Australian Petroleum Production & Exploration Association Chief Executive Samantha McCulloch said the Federal Government’s release in May of greenhouse gas storage acreage was a positive step supporting the growing deployment of CCUS technology.

"Momentum is growing for carbon capture technology around the world, with places like the US and UK unveiling substantial incentives and programs to encourage investment," she said.

"Australia must seize the extraordinary opportunity before it – for emissions reductions and economic benefits given the chance to create a new industry and jobs in a cleaner energy future."

Some of the areas identified – the Bonaparte, Browse, Northern

Commonwealth Carbon Capture Exploration Release a ‘Boost to New Net Zero Industry’
Carnavon, Perth, Otway, Bass and Gippsland basins – are covered by nine Net Zero Zones proposed in an APPEA report and featuring CCUS technology as shared infrastructure to carpool carbon emissions.

Ms McCulloch, however, said the oil & gas industry was disappointed with the separate release of a Queensland New Industry Development Strategy (QNIDS) which omitted CCUS technology from a list of targeted growth industries critical to the energy transformation to net zero.

“With its geological formations and gas infrastructure already in place, Queensland is well-placed to capitalise on the growth of CCUS technology around the world,” she said.

“Queensland has a strong understanding of extracting economic benefits from the gas industry and should be including CCUS in any plan to create a net zero economy.
GHG23-6 in the Perth Basin is near to some of the most anticipated gas plays in Australia.
“If not it will miss out on not only emissions reductions but the new investment and jobs CCUS can help deliver – adding to the 30,000 jobs already supported along the state’s gas supply chain.”

The Net Zero Zones report showed how areas like Central Queensland and the Brisbane-Surat Basin region in the south could house regional industrial and manufacturing hubs to accelerate emissions reductions and become magnets for new investment.

The NZZ concept is based on shared infrastructure and promoting the net zero building blocks of CCUS, renewables, natural gas and low-carbon hydrogen production.

The 2023 Offshore Greenhouse Gas Storage Acreage Release includes 10 areas across seven basins to explore for carbon capture and storage (CCS) sites in Commonwealth waters off Western Australia, Victoria and
Tasmania which already host a variety of offshore exploration and production activities.

Minister for Resources and Northern Australia Madeleine King said the areas had been chosen for their geology and storage potential, and following public feedback, been shaped to minimise impacts to other marine users and the marine environment.

“The Australian Government is committed to lowering emissions and helping the world to achieve net zero emissions by 2050,” Minister King said.

“Both the Climate Change Authority and the International Energy Agency have said CCS will be an important technology to help the world achieve its climate goals.”

The Climate Change Authority has said that strong and urgent emissions cuts, together with the growth in carbon sequestration, are critical if the world is to achieve its net zero goals by mid-century.

The CSIRO has said that CCUS is part of the suite of technologies that will contribute to lowering atmospheric emissions from Australia’s energy system.

The International Energy Agency recognises that CCS and CCUS will play an important role in helping to achieve net zero by 2050, particularly in hard-to-abate industrial sectors.

Minister King said the government provided $12 million in the May 2023-24 Budget to review the environmental management regime and examine ways to improve regulations to support offshore CCS projects.


The 2023 Offshore Greenhouse Gas Storage Acreage Release includes 10 areas across seven basins to explore for CCS sites in Commonwealth waters off Western Australia, Victoria and Tasmania which already host a variety of offshore exploration and production activities.
ROCKIN’ Words not only tests your knowledge of the geosciences, but also a combination of recent, newsworthy events in the energy industry with many of the answers to be found in this edition of PESA News. Have fun.

ROCKIN’ Words #30 Clues

ACROSS
3. A major Norwegian Oil Field with a shoreface sandstone reservoir is called?
5. Empire Energy signed an agreement in August with which company?
6. Uncommon sedimentary ripples with two sets of ripple crests intersecting at high angles.
7. A reservoir-drive mechanism.
8. CGG, PGS and TGS Launched the world’s first multi-client data ecosystem called?
9. New Beach Energy CEO Brett Woods was once COO of this Australian company.
10. A bedform formed in channelised environments under upper flow regime conditions.

DOWN
1. A simple, unlined, unbranched burrow orientated horizontal or oblique to bedding.
2. A type of trace fossil.
4. This country has the largest oil reserves.
5. The longest deep-crustal seismic survey ever conducted by Geoscience Australia was completed in this basin.

ROCKIN’ Words: Answers to Crossword #29

Done anything incredible lately and captured it on camera? If so, PESA News would like to showcase your adventures, experiences and special moments in our creative competition, Inspirational Images.

So, whether you’re shooting seismic in some far-flung corner of the globe, bungee jumping in New Zealand or partying up a storm in Phuket, don’t neglect to send and share your images worth 1000 words or more. After six or so editions, PESA News will publish the best portrait in landscape picture formats and award a prize to the winning snapper. So, don’t delay, send today to: editorial@pesa.com.au.

1. EAGLE EYED: Ever alert and on the lookout for something of significance to photograph, Amanda Barlow captured the San Andreas Fault area while flying over California.

2. STILL ON THE RUN: Amanda is still blazing a trail on the global marathon circuit. Picture: Unknown.
3. **EYE CANDY**: “This made me think of an oil and gas depositional environment before thousands of metres of sediment cover it up. I just love the drainage patterns,” the snapper said of her picture taken out of a plane window on the way to Kakadu. Picture: Amanda Barlow

4. **COAST TO TOAST**: The epic eastern seaboard of Tasmania. Picture: Peter Cameron

5. **EMERALD ECSTASY**: Avid hiker Ian Cockerill grins like a Cheshire Cat on discovering the delights of an emerald lake on the Tongariro Circuit in New Zealand. Picture: Juno Cockerill
Buffett Turns a Terrific Profit Trading ESG Induced Fossil Fuel Bargains

WARREN Buffet, The Oracle of Omaha, is almost as famous for his quirky quotes as he is for swimming upstream when it comes to unfashionable investments that have made the Berkshire Hathaway boss the greatest player in the history of the stock market.

People pay big money just to hear Buffett speak and two of his most quoted pearls of wisdom, one uttered to sum up the Global Financial Crisis and probably with Bernie Madoff in mind, have been: “When the tide goes out, we’ll see who has been swimming naked” and “the rearview mirror is always clearer than the windshield”.

Buffett is so revered as a Midas Touch Man that he has offered free advice to some of his prestigious peers, posing the question: “What is the fastest way to go from being a billionaire to a millionaire?”

Even though Sir Richard Branson is unlikely to agree, his answer is: “Buy an airline!”

To Buffett’s legion of followers, it came as no surprise that Berkshire Hathaway produced record earnings in 2022 boosted on the back of multibillion dollar investments made on oil & gas stocks bought when fossil fuel prices were trawling record lows at the height of Covid-induced lockdowns.

Anyone who has ever heeded Buffett’s maxim that “price is what you pay, value is what you get”, knows that he has essentially always advised smart investors to buy solid stock when the herd are stampeding faster than the bulls in Pamplona to sell.

Had they turned a pretty penny out of the pandemic, many mom and pop investors might have taken profit, perhaps a sabbatical, and then returned to trading, maybe to consider more of a renewable slice in their portfolio on the advice of a socially conscious grandchild.

Not Buffett. Another slump in commodity prices only encouraged the nonagenarian, who shows no sign of slowing down at 93, to double down on oil & gas stocks with a $5.1 billion energy war chest snapping up the prime cuts of a LNG export terminal in Maryland, increasing its Occidental Petroleum stake by 15% and investing in five Japanese commodity traders.

Buffett has always stressed that more people make their fortunes in times of financial turmoil, such as depressions and recessions, than any other period in the trading cycle. Of late he seems to be eyeing bargain buys in oil & gas stocks that are not financially fashionable due to volatility and climate change conundrums. Then again, it’s not seen as PC to be flying around the world in your private jet. But how many billionaires do we know of who have dumped their Gulf Streams and are slumming it in cattle class to cut carbon emissions?

Buffett hasn’t said much about his fossil fuel portfolio, but Cole Smead, chief executive of Smead Capital Management, summed it up succinctly, saying: “People are missing the economics that Buffett and (Berkshire vice chairman Charlie) Munger are looking at. The returns on capital in coal, oil & gas are off the charts compared with other sectors. And with ESG you can buy them cheaper than you otherwise would.”

As noted by the Australian Financial Review, Buffett is clearly a savvy investor when it comes to the oil business. His $10 billion investment in Occidental was to help the company win a bidding war against Chevron (Berkshire is the third largest shareholder in the supermajor) for a huge stake of real estate in the world’s lowest cost shale oil field.

Recently Buffett reduced his stake in Chevron by 21%. It is going to be fascinating to see whether he sees the San Ramon headquartered corporation as another bargain buy at the peak of the strike action the company was embroiled in at Gorgon and Wheatstone at the time of going to press.

He subsequently told Berkshire Hathaway stakeholders of the ‘short oil phenomena’: “In the United States, we’re lucky to have the ability to produce the kind of oil we’ve got from shale, but it is not a long-term source like you might think by watching movies.”

He has also dubbed the of logic of extremists on either side of the climate change food chain as “ridiculous”, affirming that Berkshire “will make rational decisions” and we do not think it’s un-American to be producing oil.”

As Smead put it. The man with a cult following walked through an open door left ajar by environmental activism that probably discouraged others from reaping rich rewards.

Smead said: “I love ESG because it helps keep oil & gas stocks cheap. I’m sure Buffett and Munger love ESG as well.”

There’s barely a dull day in the energy industry these days and despite lobbying to discourage investment in hydrocarbons, Warren Buffett has ignored activists and continued to make profitable trades on his fossil fuel portfolio.

Comments from readers are welcome and can be sent to: editorial@pesa.com.au

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