



'Do not be afraid to innovate and take risks to achieve your goals'

- An interview with Mr. Biswanath Ghosh*, Dir (E), Cairn Oil and Gas, Vedanta Limited



Mr. Biswanath Ghosh, Director (Exploration) at Cairn Oil and Gas, Vedanta Ltd., is a dynamic explorationist with over two decades of experience in the oil and gas exploration and production (E&P) sector. With a master's degree in applied geophysics, he began his career at Cairn in 2000 as a geophysicist and steadily rose through the ranks to his current leadership role.

In his capacity as Director (Exploration), Mr. Ghosh oversees Cairn's exploration portfolio and programs across multiple basins, spearheading the company's efforts in resource and reserve growth through greenfield exploration, appraisal, and field development. His leadership extends to initiatives under India's Open Acreage Licensing Policy (OALP) and offshore exploration ventures.

Recognized for his expertise in E&P project management, exploration geosciences, prospect maturation, and strategic assessments—including new ventures—Mr. Ghosh has been instrumental in reinforcing Cairn's standing as a key player in India's energy landscape. He is deeply committed to shaping a sustainable energy future for the country and has noted that Cairn is on course to meet 50% of India's domestic oil and gas demand.

When invited for this interview, Mr. Ghosh graciously accepted and offered valuable insights into maximizing hydrocarbon recovery, advancing sustainability, and embracing new technologies. The following are excerpts from our conversation.

- Kondal Reddy

Mr. Ghosh, to start, could you please tell us about your educational background and work experience?

I have over 25 years of experience in the upstream E&P industry. I began my career after earning a master's degree in applied geophysics from IIT-ISM Dhanbad,

where I was awarded the Gold Medal for academic excellence.

Throughout my career, I have led and contributed to several projects across multiple basins and play types across India and abroad. My core expertise spans geosciences, subsurface evaluations, prospect portfolio

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maturation, portfolio analysis and assessments, as well as E&P project management and strategy planning. I have also played a key role in global new ventures, helping to shape and execute exploration strategies at various organizational levels.

You have had a remarkable career as an explorationist so far. What would you consider to be your most cherished accomplishments in this field? What personal trait(s) saw you to this position?

I have been fortunate to work on several high impact projects and contribute directly to several pioneering hydrocarbon discoveries. Notable among these are (a) the successful basin and play openers in the Barmer Basin, including the Mangala, Bhagyam, and Aishwariya field, which added over >1 billion BOE reserves and resources (b) the pioneering discoveries in Deepwater

KG Basin and the basin-opening discoveries in Mannar Basin, and (c) the more recent discoveries of Jaya in Cambay and Rudra in Assam. These latter successes are particularly exciting, as they were achieved within OALP blocks, and required innovative thinking and the application of new techniques to unlock hydrocarbons in a mature field setting. Maintaining a positive and 'Can-Do' attitude with a bit of risk-taking appetite kept me and my team going and enabled to break multiple paradigms.

You have been associated with Cairn from the beginning of your career since 2000 and have stayed on since then. How do you view this in your career development, as another school of thought is that to climb up the ladder of success, one needs to change jobs fast?



(Speaking on the future of exploration and development activities during a panel session at GeoIndia 2024)

Throughout my career, Cairn has provided me with tremendous opportunities for learning and growth through diverse experiences, across multiple basins, geographies and project types.

I have had the privilege of working across the entire E&P value chain - from exploration and appraisal to development, on projects spanning the KG deepwater, east coast shallow water, and onshore rift systems in Barmer and Cambay basins. I also contributed to global

new ventures in Sri Lanka and Africa and evaluated several other international opportunities. The recent OALP portfolio has added further depth and variety, offering the chance to work across 12 different basins, including Assam-Arakan and Gujarat-Kutch regions. These experiences have allowed me to engage in projects both domestically and internationally. Cairn's project teams are inherently multicultural and multi-disciplinary, bringing together experienced domestic and global experts alongside talented young professionals. The high energy environment, coupled with a culture that encourages innovation and experimentation, has kept me motivated throughout.

Furthermore, Cairn, now part of Vedanta, and India's largest private producer of crude oil and gas, continues to invest across different regions and sectors.

The organization has offered me a unique and varied experience, which an individual normally gets through multiple roles across different companies. For me, all of that has been available in one place, here at Cairn.

Could you please share with our readers an overview of Cairn India/Vedanta? Specifically, we would like to know more about Cairn's/Vedanta's goals and targets and assets, especially keeping in mind the nation's requirement.

At Cairn Oil & Gas, a division of Vedanta Limited, we take pride in being India's largest private oil and gas exploration production company. Contributing approximately a quarter of India's domestic crude production, with a bold vision to increase this contribution to half, thereby strengthening India's energy security through sustainable and responsible practices.



(A mobile rig exploring in Barmer Basin, Rajasthan where Cairn Oil and Gas, Vedanta Limited has had several successes)

Our portfolio includes interests in large number of blocks (> 60) across India, covering > 70,000 sq. km. across 12 different basins. We hold an impressive gross 2P (Proved Plus Probable) and 2C (Contingent) reserve base of approximately 1.4 billion barrels of oil equivalent. As pioneers in India's oil and gas sector, we have consistently led the way in technological innovation, pursuing high-reward prospects that strengthen the country's evolving energy landscape. Our producing assets are located at Andhra Pradesh, Gujarat, Rajasthan, and Assam.

Over the past three decades, we have unlocked four frontier basins and made numerous discoveries, shaping India's energy future. Today, we are executing the country's largest private-sector oil and gas exploration projects like shale, deep water, ASP flooding, tight oil and gas, satellite fields and operations in the northeast. These efforts reaffirm our confidence in India's vast untapped hydrocarbon potential and reinforce our commitment to delivering energy security for the nation.



(Speaking on Indian Basin Potential at India Energy Week 2024)

In one of your previous statements, you mentioned that Cairn Oil and Gas has been a pioneer in the oil and gas sector, staying at the forefront of technological innovation and pursuing high-reward opportunities to strengthen India's energy landscape. Could you elaborate on this, and explain how the company is driving innovation in this field? Also, how do they align with the nation's interest of increased production and resource base.

Cairn has consistently led the adoption of cutting-edge technologies in exploration and development projects,

enhancing resources, reserves, and productions across its asset base. Several of these innovations have been industry-firsts in India and in some cases, global benchmarks. A few notable examples include:

- Time-lapse seismic (4D) technology deployed in Ravva field for advanced development long with seismic AVO techniques for near-field exploration/appraisals, significantly augmenting field life.
- Transformation of a gas field into an oil-producing asset in Cambay offshore using advanced geophysical techniques such as spectral decomposition.

- The world's longest continuously heated and insulated pipeline of ~ 705 km, transporting crude oil from Mangala oilfield in Rajasthan to Bhogat terminal in Gujarat
- The world's largest polymer flood Enhanced Oil Recovery (EOR) project, and India's largest implementation of Alkaline Surfactant Polymer (ASP) flooding techniques.
- First Indian company to apply Microseismic Hydrofracture Monitoring, enabling improved understanding of fracture behavior during stimulation.
- India's largest airborne Full Tensor Gravity Gradiometry (FTG) and magnetic survey (> 40 K sq. km. including offshore areas).
- A first-of-its-kind petro-technical cloud infrastructure, successfully implemented with multiple AI/ML tools.
- Utilizing controlled-source electromagnetic (CSEM) surveys in offshore deepwater settings to derisk exploration and appraisal activities.

All such innovations and techniques have enabled effective exploration and appraisal, while augmenting field recoveries and increasing production.

Looking ahead, what are some of Cairn's plans for growth and key aspirations, and how do you plan to implement those goals?

As mentioned before, at Cairn, we are driven by a bold vision to contribute 50% of India's domestic crude oil production. We are actively executing one of the largest E&P projects in the country across its diversified portfolio spanning both conventional and unconventional reservoirs.

Our growth strategy is firmly anchored in the following focus areas, supported by firm exploration and development plans, including seismic data acquisition and well drilling:

- Western Onshore (Barmer Basin) developments and production growths from Alkaline Surfactant Polymer (ASP) and tight oil and gas projects.

- High impact exploration growth projects in northeast India and Krishna-Godavari (KG) deepwater region, targeting significant resource additions.
- Unconventional basin-centered exploration in Rajasthan and Coal Bed Methane (CBM) in central India.
- Other near-field opportunities in shallow water and coastal regions along both the eastern and western coasts of India.

As Director (Exploration), your role involves driving new discoveries and boosting hydrocarbon production across various assets in India. What are some of the key challenges and opportunities the industry in India is currently facing, and how do you address them?

India offers a huge opportunity in oil and gas exploration, with an estimated ~300 billion BOE yet-to-find (YTF) resources across 26 sedimentary basins featuring diverse geological and subsurface settings. Among these, the deepwater offshore basins, especially the eastern offshore areas, are relatively under explored and hold huge untapped potential.

Given the current situation when domestic reserves are depleting, energy demand is surging, and import dependence is rising, the E&P industry faces three critical goals.

- Enhance prediction capabilities for discovering new hydrocarbon resources.
- Reduce cycle time from discovery to first oil/ gas.
- Improve efficiency and sustainability by increasing recovery, reducing costs, and lowering emissions.

Key challenges facing our industry

- Limited availability and seamless integration of high-quality, basin-wide geoscientific data.
- Shortage of rigs, equipment, and skilled manpower with long global mobilization lead times. Lengthy timelines for acquiring permits, clearances, and site access delay project execution.

- Several discovered resources remain undeveloped due to complex subsurface conditions and commercial challenges

There are several key approaches to overcoming these challenges.

- Data Transformation and Collaborative Models – Encourage multi-client services to increase data fidelity through expert providers.
- Technology-driven Exploration and Production
 - Apply advanced imaging, AI/ML and data analytics for better subsurface understanding and production optimization.
 - Incentivize technology deployment by allowing exploration commitments to be offset through implementation of new technologies.
- Collaborative Ecosystems

Foster partnerships between operators -service providers. Establish rig clubs and extend the multiclient model across all service domains to reduce redundancy and costs.
- Innovation hubs and Talent engagement

Create industry-academia collaborative hubs. Motivate students/research scholars/experienced professionals to tackle E&P challenges through funded, applied projects.
- Ease of doing business
 - Streamline licensing and permitting processes.
 - Implement relaxation policies and time extensions to reduce investment risks in complex stranded resources.
 - Foster international and private partnerships to accelerate development.

We understand that high-quality seismic data is crucial for hydrocarbon exploration and production. In your experience, which Basin in Cairn's portfolio presents the most challenging imaging issues, and why? Could you share an example of a particularly demanding project where your team excelled?

In the Gujarat Saurashtra – Kutch region, imaging Mesozoic targets has been particularly challenging due to the presence of thick Deccan Basalts. Although the Mesozoic play is proven and holds immense hydrocarbon potential, effective sub-basalt imaging is critical for exploration success. Conventional seismic methods often have limitations in this setting, typically allowing imaging of the basalt top but leaving the base poorly resolved. To overcome this, we utilized airborne gravity FTG and magnetic data to model basalt thickness. These models were then integrated into velocity modelling and depth imaging workflows, successfully unraveling deeper Mesozoic structures.

Similarly, in the thrust belts of the Assam-Arakan Basin, seismic data acquisition and imaging are hindered by complex topography and sparse 2D coverage. Here too, airborne FTG and magnetic surveys allowed us to integrate and apply model-based imaging techniques. By integrating multiple geophysical datasets, we were able to decipher previously undrilled structures aligned with known hydrocarbon accumulations.

Across other regions, the adoption of modern workflows—such as broadband seismic reprocessing and multi-physics integration—has significantly enhanced imaging quality, reduced exploration risk, and added substantial value by unlocking insights from vintage seismic data.

As you have contributed significantly to the OALP Blocks in Rajasthan and Cambay areas, what are the key learnings or insights you have gained from that experience?

The Barmer and Cambay are interlinked rift basins located in western onshore region of India. Leveraging geological insights and learnings across these basins has proven to be mutually beneficial and has driven exploration success.

We have achieved notable success in the Basin Margin Play, both in Rajasthan and North Cambay. In both areas we see tight reservoirs requiring hydraulic fracturing for commercial production.

In South Cambay, exploration efforts focused on stratigraphic plays led to the successful prediction of channel sand reservoirs, culminating in the Jaya gas and condensate discovery. The Field Development Plan

(FDP) for Jaya, the first FDP approved under the OALP regime, has been approved and the field is currently being monetized.

In both basins, we have identified high-confidence, near-field opportunities located close to existing infrastructure, enabling faster and more cost-effective monetization.

Additionally, significant portions of Barmer and Cambay rifts systems remain relatively underexplored. We have identified several opportunities promising prospects that are geologically analogous to proven plays in these basins, offering substantial future potential.



(Session Chair and keynote address to fast track exploration and development at India Energy Week 2025)

With evolving technologies, there is sometimes a tendency to rely too heavily on computer software to provide solutions, which can sometimes hinder analytical thinking and creativity—critical traits for developing novel geological plays. Is this awareness being fostered among younger geoscientists through hands-on training? How do you ensure that your team effectively adopts, assimilates, and masters new technologies?

Technology and digitalization go hand-in-hand in today's geoscience landscape. Most modern geoscientific advancements are rooted in computing power and software solutions. In my view, digitalization

is not just an add-on; it is a fundamental enabler that drives greater efficiency and precision in E&P operations.

In our industry it is very important to understand the scale at which we operate. When we map a basin to a prospect, spanning from thousands of square kilometers to few square kilometers. Similarly, when we begin predicting reservoirs we progressively get into meters, and further at a wellbore level we measure in only a few inches. Understanding and managing this dramatic reduction in scale is key to making informed exploration and development decisions.

Emulating subsurface conditions, whether through geophysical signals, geomechanical models or geochemical data, is where technology truly comes into play. However, this digital work must be grounded in physical understanding. Field visits, rock studies, core analysis, and operational site exposure are all parts of developing the creativity and analytical thinking needed to interpret data accurately and effectively. At Cairn, we have adopted this philosophy. By combining real-world exposure with digital innovation, and through close collaboration with global Subject Matter Experts (SMEs) and strategic partners, we ensure rapid upskilling and continuous learning for our teams.

Let me ask you a philosophical question, which you can relate to your work. Richard Feynman once said, "We never are definitely right, we can only be sure we are wrong." How do you react to this statement?

As a geoscientist, I deeply relate to the inherent uncertainty and risk involved in oil and gas exploration. It is a discipline where certainty is rare, and outcomes are always predicted within a range of possibilities rather than absolutes. Our understanding evolves with each dataset, and often, the most valuable insights come from failures. By systematically analyzing results—both successful and unsuccessful—we can continuously narrow the range of uncertainty and improve our predictive capability.

In this context, perseverance and persistence are not just desirable traits—they are essential. Exploration is a long-term, iterative process, and sustained effort over time is what ultimately leads to success. With each

attempt, we move closer to unlocking value beneath the surface.

Beyond your professional responsibilities, what are some of your personal interests or passions?

Outside of work, I enjoy traveling and exploring new places, which offer fresh perspectives and inspiration. I also have a deep appreciation for music—soft rock being one of my favorite genres for its rhythm and emotional depth.

What message would you give to young professionals who are entering the oil and gas industry today? Further, if you look back at your professional life so far, and there is one narration, I will request you to say that for our readers.

Oil and gas will continue to play an important role in India's energy mix for decades to come. As professionals in this industry, it is important to stay resilient, innovative, and not be afraid of taking calculated risks. These qualities are essential to unlocking new resources and reserves, and to doing so in a manner that aligns with our goals for sustainability and national energy security.

I would like to quote Parke A. Dickey (1958)

"We usually find oil in a new place with old ideas.

Sometimes, we find oil in an old place with a new idea, but we seldom find much oil in an old place with an old idea." 