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Brill-Viz

Independent Public-Data Analysis
And Strategic Synthesis

A 'Bird's-Eye View' of

MOL Group's Business Sustainability In Pakistan

Corporate Intelligence

Stratigic Resilience

E&P Contributions

Security, Political & Regulatory Risks

CSR/ESG & Community Impact

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Abstract

This independent public-data review evaluates MOL Pakistan within the wider MOL Group operating model by integrating upstream performance, global portfolio position, security and political-regulatory exposure, community conditions, CSR/ESG evidence, strategic communications and indicative economics. The analysis draws on MOL Group and MOL Pakistan disclosures, the Pakistan Energy Yearbook 2024-25, national census and agriculture/WASH data and GIS layers, which helped create project-specific analytical workbooks. On the Energy Yearbook operator-attributed basis, standardized MOL-operated production declined from about 25.2 MMBOE/year in FY2019-20 to 15.5 MMBOE/year in FY2024-25, while the 30 June 2025 aggregation retains approximately 14.041 MMbbl oil and 489.27 BCF gas of remaining 2P reserves.

At Group level, MOL Pakistan contributed about 4.5% of FY2025 entitlement production and roughly 3.5% of published year-end 2024 2P reserves. The study also finds that MOL Pakistan's sustained operating presence in a security-sensitive environment is evidence of institutional resilience and commitment, while public CSR evidence is stronger on activities and outputs than on standardized long-term outcomes. Indicative economic screening uses transparent US$70/90/110 per BOE gross-value-equivalent cases. The annual production rate fell from 25.2 MMBOE/year in FY2019-20 to 15.5 MMBOE/year in FY2024-25, leaving an endpoint annual production-rate gap of 9.7 MMBOE/year. Across the five annual intervals, this equates to an average linear reduction in the annual production rate of about 1.94 MMBOE/year per year (approximately 9.3% compound annual decline). The 9.7 MMBOE/year endpoint gap corresponds to annualized gross materiality of about US$679 million, US$873 million and US$1.067 billion under the US$70/90/110 cases; the average yearly erosion of 1.94 MMBOE/year corresponds to approximately US$136 million, US$175 million and US$213 million of annual gross-value capacity lost per year of elapsed time on a simple linearized basis. A full-year 1-5 kboe/d curtailment spans about US$25.6-200.8 million across the same range; and the standardized 95.586 MMBOE remaining reserve base gives an undiscounted gross-value envelope of about US$6.691-10.514 billion.

These are screening proxies, not MOL revenue, NPV, IRR or asset valuations. The review concludes that Pakistan keeps a strategically meaningful MOL upstream position within MOL's already mature ERM, sustainability and governance systems.

Keywords: MOL Pakistan; upstream E&P; business sustainability; security resilience; political and regulatory risk; CSR; ESG; petroleum economics; corporate intelligence.

Nature of This Review

This document is an independent external synthesis based on public corporate disclosures, Pakistan national datasets and the project-specific analytical workbooks assembled for this study. It is not an audit of MOL Pakistan, does not have access to confidential internal systems, and is not intended as a judgement that MOL lacks the controls proposed in this paper. Its purpose is to understand MOL Group's global operational character, management philosophy and publicly evidenced practices; position Pakistan within that wider business model; identify where external evidence is incomplete or where cross-functional integration could add analytical value; and formulate questions or enhancement opportunities for validation with MOL's existing systems.

The review also recognizes an important positive conclusion. MOL Pakistan's sustained presence since 1999, material cumulative investment with JV partners, continuing position in the Group's international upstream portfolio and ability to operate across a demanding political, regulatory, macroeconomic, security, demographic, social, cultural and geographic environment are evidence of institutional resilience, adaptive capability and durable operating relationships. The analysis is intended to appreciate and learn from an established operating model while identifying where greater public transparency, Pakistan-specific integration or additional evidence could further strengthen an already mature system.

Security resilience is a particularly important part of that conclusion. MOL's core Tal-area activities are located in a part of Khyber Pakhtunkhwa that external government travel advisories continue to classify as security-sensitive; current UK guidance advises against all travel to Hangu, Karak and Kohat districts. MOL's own public reporting also confirms that security exposure has at times affected operations. The 2023 Integrated Annual Report records an armed attack on the Manzalai-10 wellhead in May 2023 in which six security guards were killed, while the 2023 half-year report notes wells being shut in partly because of security issues. Against that background, MOL Pakistan's continued exploration, development, production, JV coordination and community engagement merits recognition as evidence of operating commitment and institutional resilience. The study does not infer the effectiveness of individual internal controls beyond the published evidence, but the long-term record demonstrates that security risk has been actively managed rather than avoided by withdrawing from the area.

Executive Summary

This synthesis develops an integrated decision framework for MOL Pakistan at the intersection of upstream energy, political and regulatory intelligence, community relations, CSR/social investment, environmental stewardship, ESG reporting and strategic communication. Its central argument is that these functions are best managed as one evidence system because each can materially influence project access, operating continuity, reputation, capital efficiency and long-term stakeholder value.

The current quantitative evidence shows a material mature-asset challenge. On the Pakistan Energy Yearbook operator-attributed basis, standardized MOL-operated production declined from 25.2 MMBOE/year in FY2019-20 to 15.5 MMBOE/year in FY2024-25, a decline of 38.6%. Chapter 4 peer comparison shows that this decline is material within the domestic E&P context, although differences in asset mix, working interest, development cycle and reporting basis mean the comparison is best used for context rather than a simple performance ranking. Liquids and gas both decline materially, reinforcing the interpretation of a mature producing system in which reserve replacement, field optimization, development timing, compression, commercialization and curtailment management are strategically important.

The Yearbook-based reserve analysis indicates remaining operator-attributed 2P balances of approximately 14.041 MMbbl oil and 489.27 BCF gas at 30 June 2025. The revised field panels now show original 2P reserves, cumulative production and remaining 2P together, making depletion maturity as important as the remaining balance alone. Makori East remains the largest oil balance and one of the dominant gas positions, while the field-by-field comparison shows why asset reliability, development execution, reserve replacement and evacuation/commercialization are best assessed against both remaining inventory and depletion history.

A global MOL Group benchmark adds an important perspective. MOL Group reported FY2025 entitlement production of 94.7 kboe/d, of which Pakistan contributed 4.3 kboe/d, or about 4.5%. Pakistan had contributed 5.3 kboe/d in FY2024, about 5.6% of Group production. On the published year-end 2024 reserve bases, MOL Pakistan's 11.2 MMBOE of 2P reserves correspond to roughly 3.5% of MOL Group's 316 MMBOE. Pakistan remains a meaningful international upstream position, but its relative contribution weakened in 2025 as Group production increased and Pakistan experienced Tal-field constraints. This strengthens the case for production restoration, timely monetization of discoveries and disciplined management of non-technical constraints.

The indicative economic interpretation adds another distinction. Pakistan contributed about 4.5% of MOL Group's FY2025 production and roughly 3.5% of published year-end 2024 2P reserves, while its FY2025 organic upstream CAPEX share was about 1.8%; these are different metric bases and are not accounting equivalents. Chapter 4 uses transparent US$70/90/110 per BOE gross-value-equivalent screening cases. The annual production rate declined from 25.2 to 15.5 MMBOE/year between FY2019-20 and FY2024-25: an endpoint gap of 9.7 MMBOE/year across five annual intervals, equivalent to an average linear reduction of about 1.94 MMBOE/year in the production rate per year (approximately 9.3% compound annual decline). The endpoint gap corresponds to annualized gross materiality of about US$679 million, US$873 million and US$1.067 billion under the three screening cases. The linearized average annual erosion corresponds to about US$136 million, US$175 million and US$213 million of additional annual gross-value capacity lost in each successive year, respectively. For a full-year curtailment case, 1, 3 and 5 kboe/d span approximately US$25.6-40.2 million, US$76.7-120.5 million and US$127.8-200.8 million, respectively, across the same price-equivalent range. The standardized 95.586 MMBOE remaining reserve base produces an undiscounted gross-value envelope of about US$6.691-10.514 billion. These are decision-support proxies only, not MOL Pakistan revenue, lost profit, NPV, IRR, netback or audited asset value.

The CSR register currently captures 22 public MOL Pakistan projects or case studies across nine themes. Publicly quantified funding in the register totals PKR 498.85 million, while documented beneficiary instances total 15,820. These totals are deliberately not presented as complete portfolio expenditure or unique beneficiaries: cost and beneficiary disclosure is available for only a subset of projects, and two large projects dominate the quantified totals. This is itself a central finding-the public evidence base is stronger on activity and outputs than on standardized outcome measurement.

The community baseline also shows why social investment benefits from geographic differentiation. Karak, Hangu, Kohat, Islamabad and Dera Ghazi Khan differ substantially in literacy, urbanization, water access and agricultural structure. Karak has the largest water-access gap among the five screening areas, while Hangu has the lowest literacy rate in the current dataset. Islamabad has much stronger district-level indicators but remains too coarse a proxy for specific Margala-area communities. Dera Ghazi Khan has a large rural population and material agricultural exposure but comparatively little MOL-specific CSR evidence in the public register reviewed so far.

The ESG architecture is substantially more mature conceptually than numerically. MOL Group already maintains an extensive ESG data structure, while MOL Pakistan publicly identifies waste, emissions, water scarcity and biodiversity as local environmental priorities. Pakistan's adoption of IFRS S1/S2 in phases and the SECP's revised ESG disclosure guidance increase the value of establishing clear local data ownership, controls, reporting frequency and assurance trails even where the legal applicability to a specific entity must be confirmed.

The recommended management model is neither CSR as philanthropy, nor ESG as disclosure, nor regulatory monitoring as a standalone corporate-affairs exercise. The proposed model is:

Risk → Intelligence → Intervention → Impact → Trust → Resilience → Value.

It is supported by four linked systems: a Political-Regulatory-Community Risk Observatory; a Community Need and Investment Priority framework; a CSR/ESG Impact Observatory; and an evidence-controlled Communication & Impact Calendar.

It is, of course, not intended to replace MOL Group's existing risk-governance architecture. MOL Group publicly describes a comprehensive Enterprise Risk Management (ERM) system embedded in corporate governance, covering significant risks across business and functional units, geographies and projects, with risks identified, assessed, evaluated, treated and monitored across multiple time horizons and reported regularly to top management and the Board of Directors. The Pakistan-specific observatory and visulas in this synthesis are analytical views that can align with and enrich the existing Group ERM framework where useful.

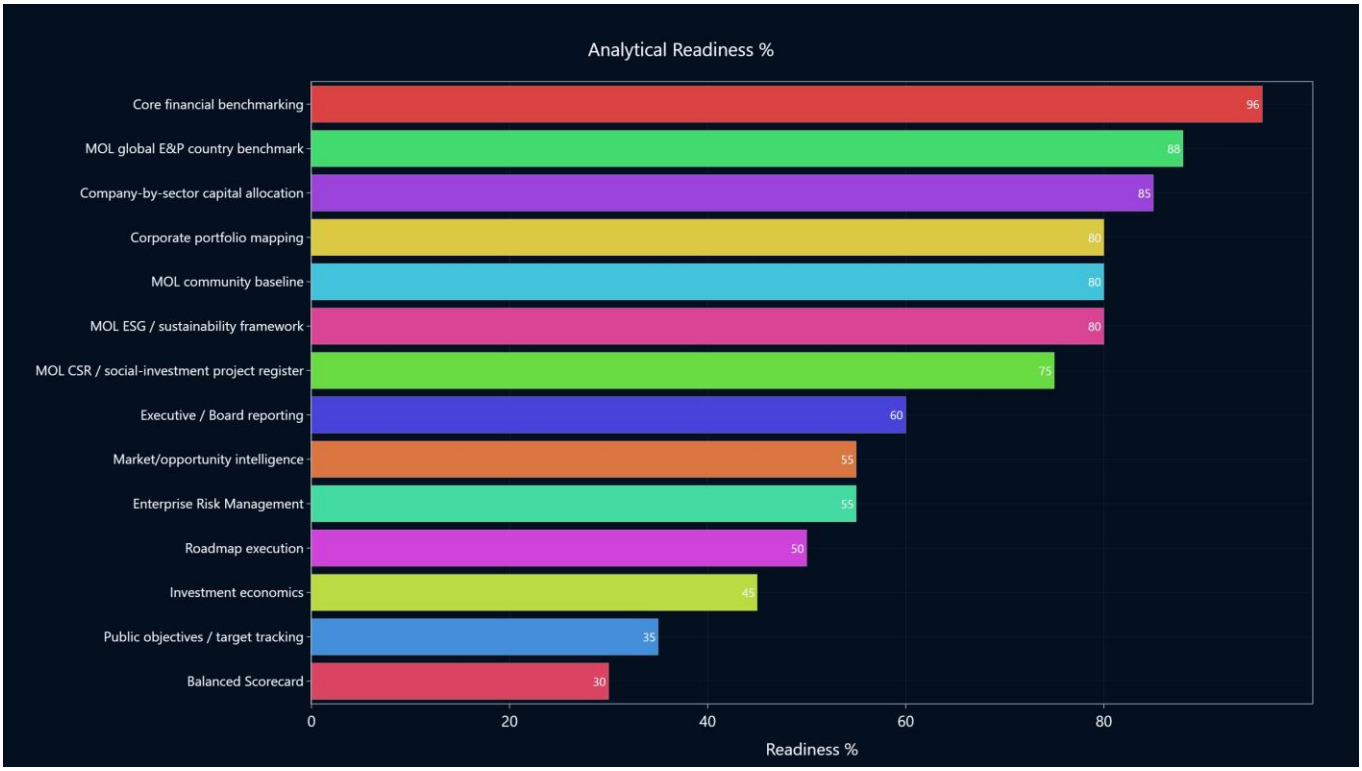


Figure ES-1. Analytical data readiness across the wider strategy and MOL-specific workstreams.

Table ES-1. Priority findings, public evidence and management implications.

Priority finding	Evidence in current analysis	Management implication
Mature-asset pressure	Standardized operator-attributed production down 38.6% since FY2019-20	Link community/regulatory intelligence to asset continuity and reserve-replacement strategy.
Reserve concentration	Makori East carries ~47% of remaining oil and ~32% of gas balance	Protect high-value asset reliability and evacuation; monitor field-specific non-technical risks.
Public CSR outcome-evidence gap	22 projects captured but only 7 with explicit funding values	Validate existing internal project controls; where useful, strengthen public baseline, beneficiary and post-completion evidence.
Community heterogeneity	Large differences in literacy, water access and agricultural context	Differentiate planning by geography and validate how the existing portfolio already reflects local need.
Water materiality	MOL identifies water scarcity as serious; WASH is a recurring CSR theme	Treat water as both environmental KPI and social-licence issue.
ESG data maturity	Framework strong; many Pakistan numeric series not public	Confirm Pakistan-level KPI ownership, control and assurance linkage within MOL Group's existing reporting architecture.

Key Take-Aways of the Review/Synthesis

The central findings below should be read as an independent strategic interpretation of public evidence, not as an external audit of MOL Pakistan or a substitute for its internal operating, security, financial or risk-management systems.

- **Operating successfully in a high-security-risk and turbulent environment is itself a remarkable dimension of business performance.** MOL Pakistan has sustained exploration, development, production, JV coordination and community engagement since 1999, including in the Tal-area districts of Hangu, Karak and Kohat, where the external security environment is demonstrably difficult. The documented 2023 Manzalai-10 attack and periods of security-related well shut-ins show that this exposure is operationally real. Continuing to invest and operate under such conditions merits recognition as evidence of resilience, continuity planning, local relationships and institutional capability-not merely treated as a risk statistic.
- **Security risk is not being presented as a positive condition.** The strategic point is that MOL Pakistan has continued to operate despite elevated exposure. Sustained performance under these conditions does not imply that incidents can always be prevented, but it does demonstrate an ability to manage risk rather than avoid the operating area.
- **Pakistan remains a meaningful, though not dominant, part of MOL Group's upstream portfolio.** FY2025 entitlement production contributed about 4.5% of Group production, while the published year-end 2024 2P reserve share was about 3.5%. Pakistan, therefore, remains large enough for production recovery, reserve replacement and exploration success to matter strategically.
- **Mature-asset production decline should be interpreted as a lifecycle issue,** not automatically as operational underperformance. The revised domestic peer comparison confirms that MOL Pakistan's decline is material, but differences in portfolio composition and investment cycles prevent a simplistic ranking. The strategic requirement is to replace, stabilize or partially offset decline through exploration, appraisal, field optimization, development and timely commercialization.
- **Reserve concentration and depletion maturity increase the value of asset-specific intelligence**. The revised oil and gas panels distinguish original 2P reserves, cumulative production and remaining 2P by field, showing that the largest historical producers are not necessarily the largest remaining growth options. Reliability, evacuation, security, community access, regulatory issues and development timing warrant direct linkage to the fields and volumes they can affect.
- **Non-technical risk is part of upstream business performance, not an adjacent corporate-affairs issue.** Gas offtake, permitting, security, land and road access, stakeholder relationships, environmental performance and community acceptance can influence production continuity, development timing, monetization and capital efficiency. This is why the synthesis links political, regulatory and community intelligence to the core E&P portfolio.

- **MOL Group's mature ERM and ESG architecture is an existing strength.** The Pakistan-focused observatories and dashboards proposed in this review are intended to align with and enrich existing Group systems where useful, not to imply that MOL lacks risk governance, sustainability controls or internal management processes.
- **CSR and social investment are better judged by outcomes and local need, not expenditure alone.** The public evidence demonstrates substantial activity, but standardized outcome and post-completion evidence is less consistently visible. The district analysis also shows that Karak, Hangu, Kohat, Islamabad/Margala and Dera Ghazi Khan have materially different social, WASH and livelihood contexts.
- **The economics in this synthesis are deliberately indicative** but now distinguish the endpoint production-rate gap from the rate of decline. Production fell from 25.2 to 15.5 MMBOE/year between FY2019-20 and FY2024-25, leaving a 9.7 MMBOE/year endpoint gap across five annual intervals. The simple average reduction in the annual production rate is about 1.94 MMBOE/year per year (approximately 9.3% compound annual decline), not 9.7 MMBOE/year per year. Under US$70/90/110 per BOE screening equivalents, the 9.7 MMBOE/year endpoint gap corresponds to about US$679 million/US$873 million/US$1.067 billion of annualized gross materiality, while the linearized average yearly erosion corresponds to about US$136 million/US$175 million/US$213 million of incremental annual gross-value capacity lost per year of elapsed time. A full-year 1-5 kboe/d curtailment spans about US$25.6-200.8 million across the range; and the standardized 95.586 MMBOE remaining reserve base gives an undiscounted gross envelope of about US$6.691-10.514 billion. These are not MOL revenue forecasts, lost profit, netbacks or project valuations; defensible point-forward/full-life economics require official production, pricing, ownership, CAPEX, OPEX, fiscal, timing and discount-rate inputs.
- **The principal contribution is integration.** The review brings production, reserves, capital allocation, security, regulatory exposure, community conditions, CSR/ESG evidence and strategic communication into one decision architecture. Its value lies in showing how these factors interact in business resilience and where additional internal evidence could support stronger decisions.

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1. Introduction and Strategic Rationale

MOL Pakistan operates within a business environment in which technical subsurface success is necessary but not sufficient. Exploration and production outcomes depend on resource quality and explotation, but they also depend on permits, fiscal terms, market access, allocation, security, land and road access, environmental performance, JV relationships and the continuing acceptance of host communities. A strong corporate-affairs and sustainability function has direct strategic relevance to the core business.

The study integrates political and regulatory risk identification, impact analysis and reporting, CSR project design and impact assessment, internal and external communication, sustainability reporting and project management. Rather than treating those responsibilities as separate disciplines, the synthesis connects them within a single management architecture.

The study also draws on related bodies of analytical work developed by the author: the Sustainable Energy Systems and Energy Security in Pakistan, Pakistan Energy synthesis and policy-paper architecture; Water-Food-Agriculture project with district WASH, demographic and agricultural data (in progress); and the Corporate Strategy project with company benchmarking, reserves/production, risks and decision frameworks. The MOL synthesis integrates validated evidence from those workstreams without duplicating their underlying databases.

1.1 Core Conceptual Model

The central model is:

Energy → Business Exposure → Political / Regulatory / Community Risk → Intervention → Impact → Communication → Strategy

At operating level, the model becomes:

Risk → Intelligence → Intervention → Impact → Trust → Business Resilience → Value

1.2 Interpretation Boundaries

- CSR expenditure is an input, not an outcome. A project cannot be labelled successful only because funding was spent or infrastructure was delivered.
- Public district statistics are useful for screening but cannot substitute for village- or project-level baselines where material investment decisions are being made.
- Operator-attributed Yearbook reserves and production are not the same as MOL's equity/working-interest measures. The two bases are separated throughout.
- ESG disclosure is not equivalent to sustainability performance. The underlying operational metrics must remain primary.
- Missing public evidence is retained as missing; it is not silently converted to zero or inferred from unrelated benchmarks.
- Recommendations in this paper are analytical proposals, not claims about MOL Pakistan's approved internal strategy, risk appetite or budgets.

1.3 Nature, Purpose and Stance of the Independent Review

This synthesis is an independent review of MOL Pakistan within the broader MOL Group operating model. It examines publicly visible aspects of corporate strategy, risk governance, upstream portfolio management, JV working style, sustainability, community investment, ESG reporting and communication. The objective is not to reproduce MOL's confidential internal processes or to score management performance from outside the organization.

The review uses three evidence categories:

1. Practices and strengths that are publicly evidenced,
2. Areas where external evidence is incomplete and require validation rather than assumption,

3. Optional analytical enhancements proposed by this synthesis. A missing public metric is treated as a transparency or research gap unless there is specific evidence that an internal control is absent or ineffective.

This stance is especially important in Pakistan. Maintaining a long-running upstream business in a country characterized by evolving petroleum policy, macroeconomic and foreign-exchange pressure, security and access challenges, diverse local communities, water and climate constraints, difficult terrain and complex federal-provincial relationships requires more than subsurface success. MOL Pakistan's longevity and continuing contribution to the Group portfolio are interpreted as evidence that significant operational, governance, stakeholder and risk-management capability already exists.

2. Scope, Questions and Methodology

The study covers MOL Pakistan's E&P footprint, energy-system context, political/regulatory risk, operating-community conditions, CSR/social investment, environmental sustainability, ESG reporting, stakeholder engagement, communication and management dashboards. The implementation horizon is 2026–2035, with shorter annual and quarterly review cycles.

Table 2-1. Core management questions, evidence base and decision outputs.

Management question	Evidence base	Decision output
Is the core business sufficiently resilient?	Reserves, production, field maturity, development, curtailment, energy outlook	Asset sustainability priorities and non-technical risk focus.
Which external risks could affect operations?	Policy, regulation, security, fiscal/market developments, stakeholder issues	Risk register, triggers, impact pathways and mitigation actions.
Where is community need greatest?	Demography, literacy, WASH, livelihoods, climate and asset proximity	Community need / investment priority screening.
Are CSR projects working?	Cost, beneficiary, output, outcome and post-handover evidence	Scale / redesign / partner / discontinue decisions.
What ESG data require local ownership?	MOL Group ESG architecture, IFRS S1/S2, SECP, GRI/SDGs	Local KPI catalogue, ownership, controls and reporting cadence.
How can impact be communicated effectively?	Verified metrics, audience, claims, evidence, timing	Newsletter, executive brief, impact story and campaign architecture.

2.1 Data Architecture

The quantitative backbone is the Brill-Viz MOL-expanded Corporate Strategy dataset. Dedicated modules cover MOL profile and blocks, field-level reserves, production time series, CSR projects, community baseline, ESG framework, impact KPIs, evidence register and risk register.

The global extension now also includes MOL_GLOBAL_EP_COUNTRIES / MASTER_MOL_GLOBAL_EP_COUNTRIES and ISO3-ready MOL_GLOBAL_EP_MAP_DATA / MASTER_MOL_GLOBAL_EP_MAP_DATA for the verified 10-country E&P portfolio. Source URLs and source-year fields are retained in the underlying workbooks for traceability.

The present synthesis uses these analytical modules directly. Each figure states its source basis and, where necessary, an interpretation boundary so that published evidence, derived indicators and analytical assumptions remain distinguishable.

2.2 Five Analytical Outcomes Gained from this Review

The review has already produced five useful outcomes that go beyond a conventional company profile. These outcomes explain why the synthesis is valuable even where public evidence remains incomplete.

Table 2-2. Five analytical outcomes established by the review.

Outcome gained	What the review established	Why it matters
1. Pakistan's position inside MOL Group is now quantified	Pakistan can be viewed as part of MOL's international upstream portfolio rather than only as a domestic E&P case.	Provides context for production, reserves, capital allocation and future portfolio significance.
2. Business resilience is linked to asset concentration and operating security	The review connects mature-field decline, reserve concentration, curtailment, commercialization and documented security/access exposure with continuity of operations.	Shows that Pakistan's value depends not only on subsurface performance but also on MOL's demonstrated ability to sustain operations under complex non-technical conditions.
3. CSR evidence is separated into activity, output, outcome and impact	Public material shows sustained activity and many outputs, while standardized long-term outcome evidence is less visible externally.	Avoids unfair criticism and identifies where internal validation or greater public transparency could make impact claims more conclusive.
4. Community heterogeneity is converted into a decision variable	Karak, Hangu, Kohat, Islamabad/Margala and Dera Ghazi Khan show materially different WASH, literacy, livelihood and geographic contexts.	Supports location-specific social investment rather than assuming a uniform community profile.
5. MOL's mature global ERM/ESG architecture changes the framing of recommendations	The study recognizes Group-level ERM, integrated reporting and sustainability systems as existing strengths.	Recommendations become validation, alignment and enhancement opportunities instead of presumed institutional deficiencies.

3. MOL Pakistan Business and E&P Context

MOL Pakistan is operating in the country since 1999 as a wholly owned MOL Group subsidiary. The current public operating footprint comprises four blocks: Tal and Margala as operated interests, and Karak and Dera Ghazi Khan as non-operated interests. MOL Pakistan reports cumulative investment together with JV partners of approximately US$2.8 billion.

The long operating history matters strategically. It means MOL Pakistan is not simply an investor exposed to country risk; it is an embedded operator whose performance depends on durable relationships with regulators, JV partners, suppliers, district administrations and communities. This makes the quality of political, regulatory and community intelligence especially important.

Table 3-1. MOL Pakistan block portfolio and analytical significance.

Block	Role	Current status / context	Analytical significance
Tal	Operated	Producing, exploration and development	Core production, reserve and community-risk focus.
Margala	Operated	Exploration / Islamabad-area context	Exploration, environmental and peri-urban stakeholder exposure.
Karak	Non-operated	E&P portfolio	Partner-governance and non-operated exposure.
Dera Ghazi Khan	Non-operated	Exploration / E&P portfolio	Large rural/agricultural district; current community-data and CSR gap.

3.1 MOL Group Financial Context and Pakistan Capital Allocation

MOL Pakistan's local financial statements are not used as a substitute for public parent-level data. In the corporate benchmark dataset, MOL Group 2025 revenue, profit and organic capital expenditure are retained explicitly as parent-group metrics, while Pakistan production and Pakistan-specific upstream CAPEX are separately identified. This separation is essential because a global integrated-energy balance sheet cannot be interpreted as the standalone economics of the Pakistan subsidiary.

The current dataset records MOL Group FY2025 organic upstream CAPEX of approximately US$385 million and Pakistan organic upstream CAPEX of about US$6.8 million, comprising exploration, development and other upstream activity. The Pakistan figure is a country subset and must not be added again to the group total.

3.2 MOL Pakistan in the Global MOL Group Portfolio

MOL Group is an international integrated energy company active in more than 30 countries with approximately 25,000 employees. Its upstream portfolio has production activities in eight countries and exploration assets across a wider international footprint. Pakistan merits assessment not only against domestic peers, but also against the capital, production and reserve contribution of MOL's wider international portfolio.

The FY2025 country breakdown provides the clearest comparable production benchmark. Hungary remained the largest contributor at 37.1 kboe/d, followed by Croatia at 19.7 and Azerbaijan at 13.4. Pakistan contributed 4.3

kboe/d, slightly above the Kurdistan Region of Iraq at 4.1 kboe/d. This made Pakistan the fourth-largest individually identified country/region in the FY2025 breakdown, excluding the separate associated-companies category.

Table 3-2. Selected MOL Group and Pakistan context indicators.

Indicator	MOL Group	Pakistan	Primary source
Group footprint	>30 countries; ~25,000 employees	Pakistan is one long-standing international operating market	MOL Group company overview
Upstream production footprint	Production in 8 countries	Pakistan included among producing countries	MOL Group 2025/2026 disclosures
FY2024 entitlement production	93.9 kboe/d	5.3 kboe/d (~5.6% of Group)	MOL Group Q4 2025 presentation
FY2025 entitlement production	94.7 kboe/d	4.3 kboe/d (~4.5% of Group)	MOL Group Q4 2025 presentation
YE2024 2P reserves	316 MMBOE	11.2 MMBOE (~3.5% of Group)	MOL investor presentation; MOL Pakistan
Pakistan operating history	-	Since 1999	MOL Pakistan
Current Pakistan blocks	-	4: Tal & Margala operated; Karak & DG Khan non-operated	MOL Pakistan
Cumulative Pakistan investment	-	US$2.8bn with JV partners	MOL Pakistan

Interpretation note: MOL Group production figures are entitlement production and include consolidated assets plus a separately disclosed associated-companies category. Pakistan Energy Yearbook figures elsewhere in this paper are operator-attributed field volumes and cannot substitute for MOL's Group-reporting country contribution. The global section uses MOL's own Group-reporting basis for like-for-like portfolio comparison.

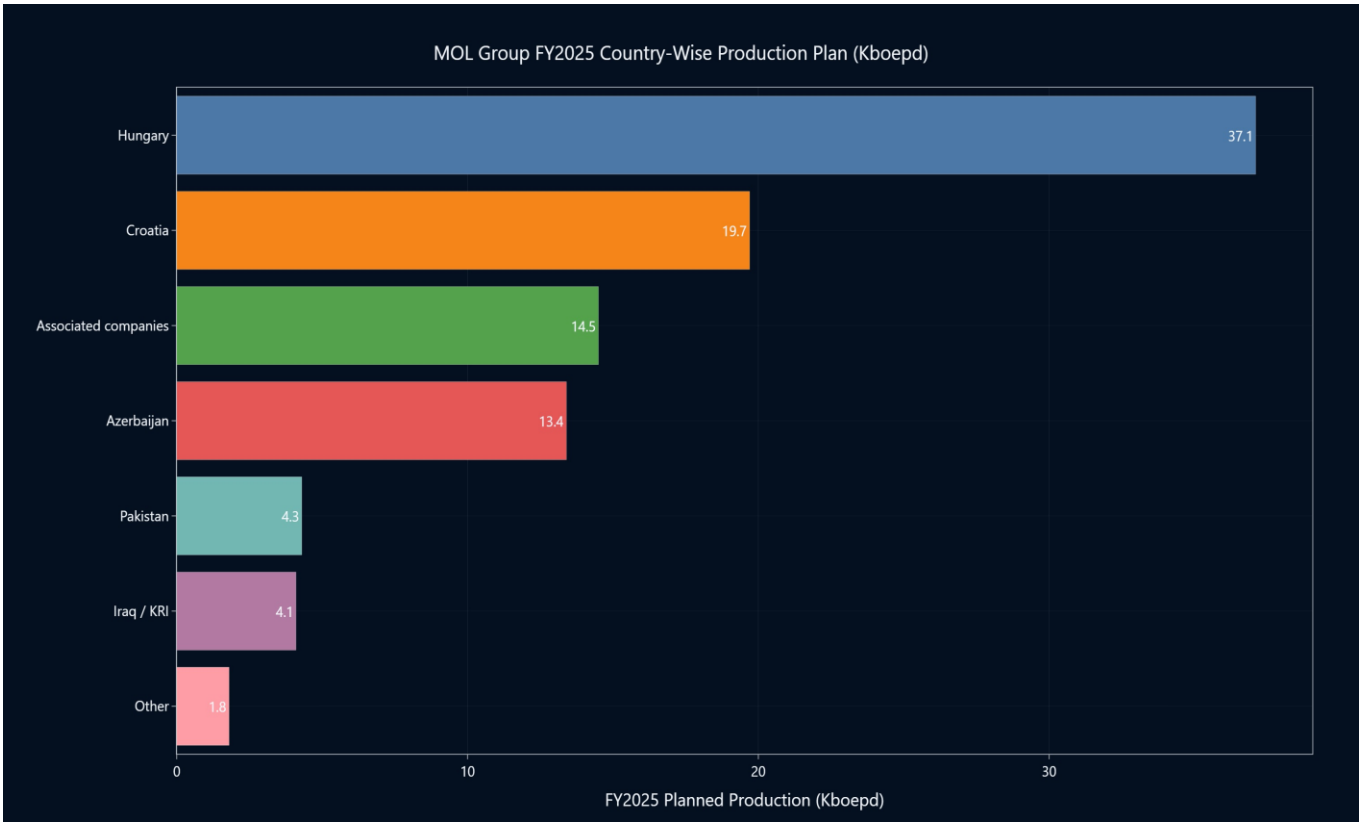


Figure 3-1. MOL Group FY2025 entitlement production by country / region.

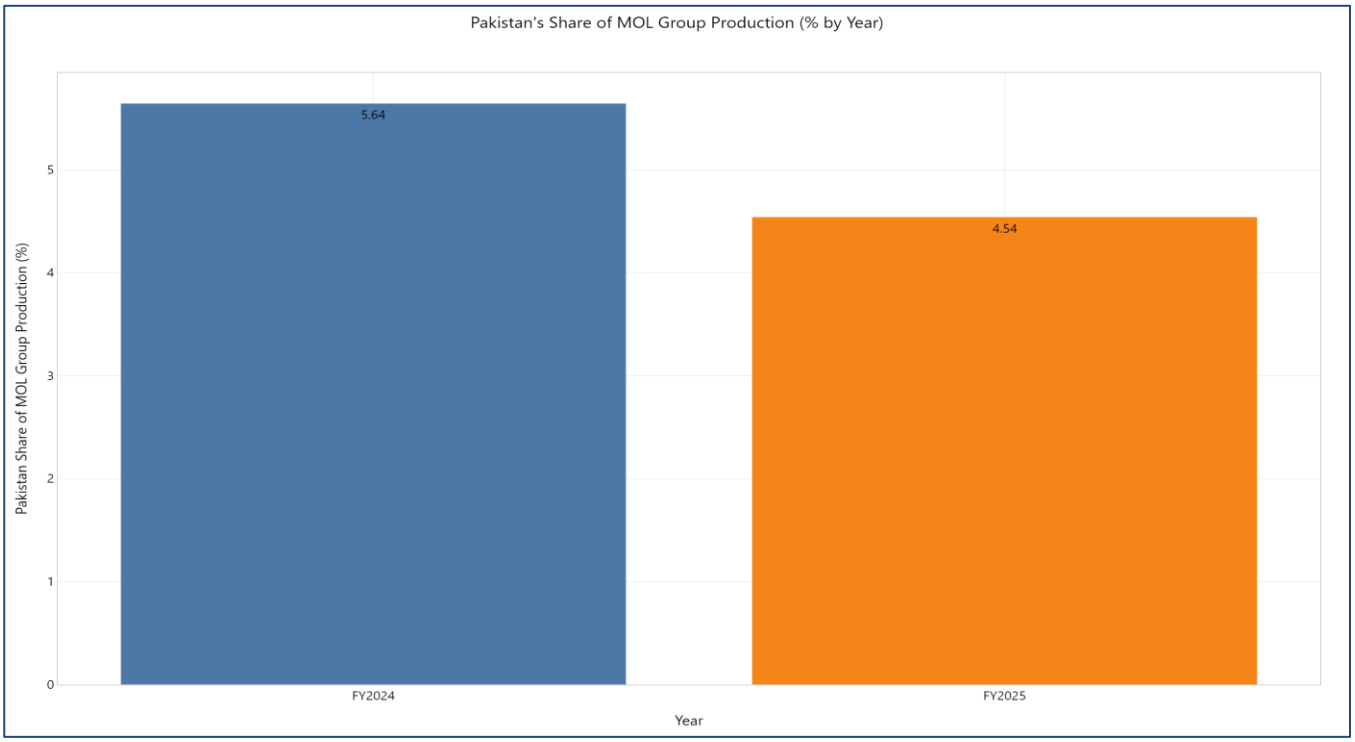


Figure 3-2. Pakistan's share of MOL Group production, FY2024 and FY2025.

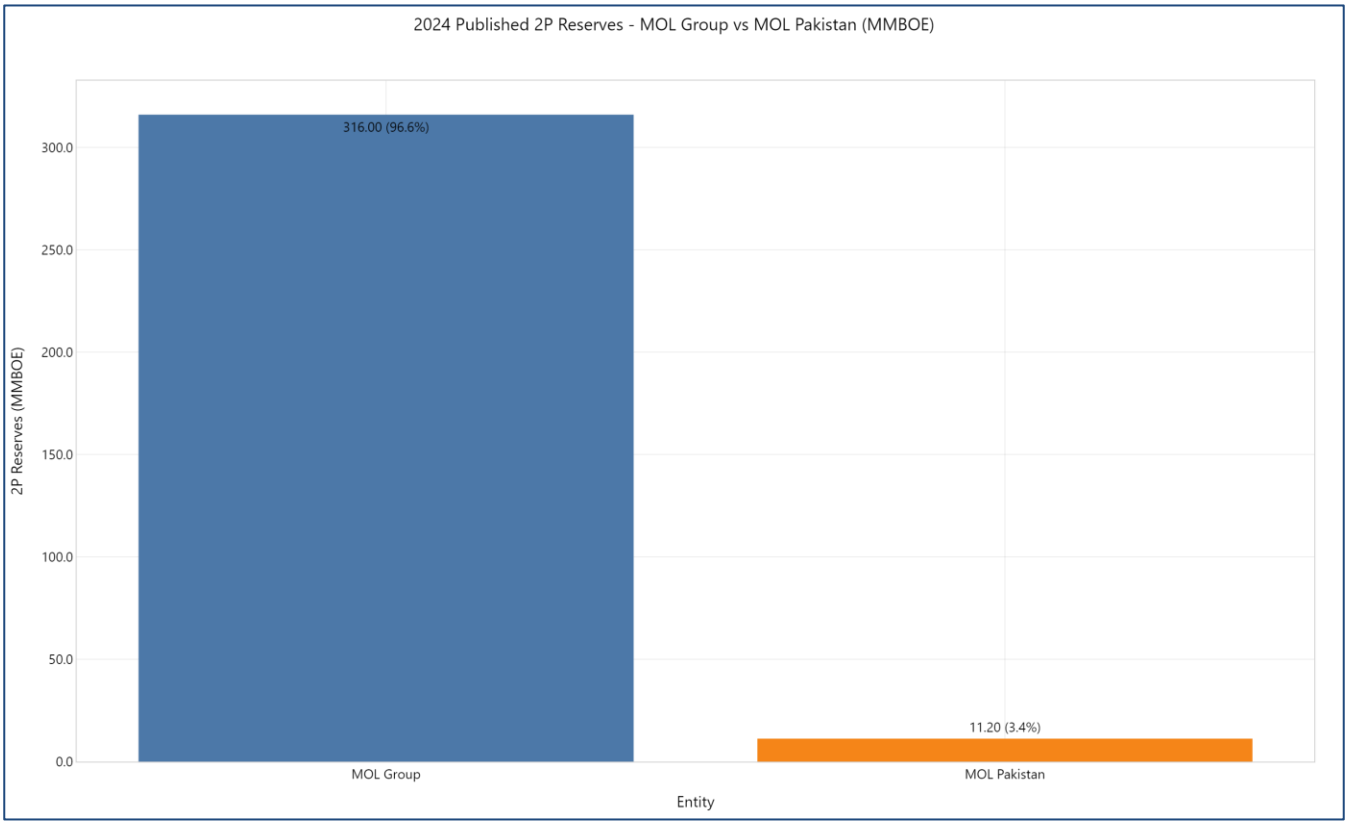


Figure 3-3. Published 2P reserves: MOL Group versus MOL Pakistan, year-end 2024 bases.

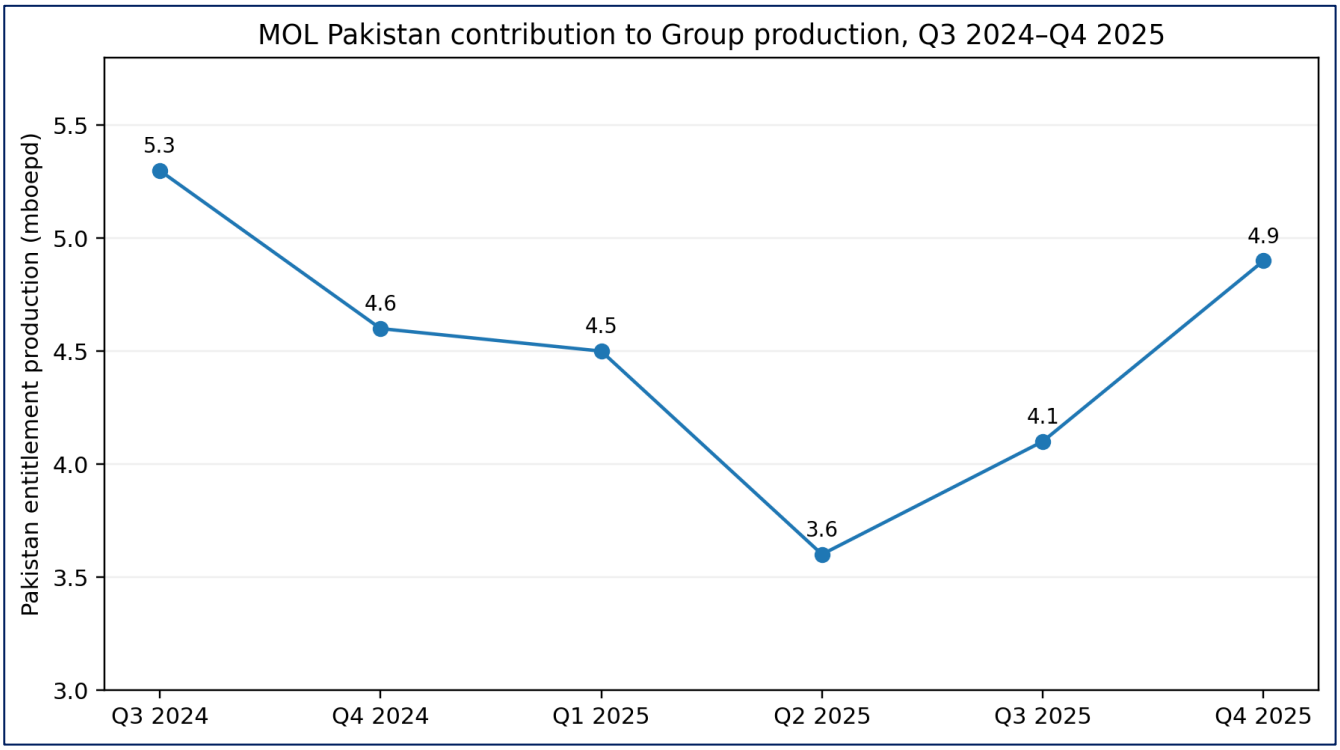


Figure 3-4. MOL Pakistan entitlement production contribution, Q3 2024 to Q4 2025.

3.2.1 Strategic Interpretation

- Pakistan is material but not dominant in MOL Group's upstream portfolio. Its FY2025 production contribution of about 4.5% is meaningful enough for operating recovery and exploration success to matter at Group level, but small enough that capital must compete with larger positions in Hungary, Croatia, Azerbaijan and other international assets.
- Pakistan's share of Group production fell from about 5.6% in FY2024 to 4.5% in FY2025 even as total Group production increased. This indicates relative portfolio underperformance in 2025, not simply a Group-wide downturn.
- The Q4 2025 recovery to 4.9 kboe/d suggests that the 2025 low point was not purely geological decline; operating and evacuation constraints also matter. This reinforces the paper's emphasis on commercialization, infrastructure and non-technical risk alongside subsurface performance.
- Pakistan's published 2024 2P reserve share is smaller than its FY2024 production share. On a cautious indicative basis, this points to continued reserve-replacement pressure and strengthens the strategic value of exploration, appraisal and timely development of recent discoveries.
- The international benchmark can serve as a recurring management dashboard: Pakistan production share, reserve share, reserve replacement, upstream CAPEX share, unit cost and major project milestones require tracking against the Group portfolio rather than viewed only against domestic peers.

3.2.2 Spatial Portfolio View and Pakistan's Position

The new MOL global E&P country dataset allows the international portfolio to be viewed spatially rather than only through ranked bars. The verified analytical set contains ten countries: eight producing countries-Hungary, Croatia, Azerbaijan, Iraq/Kurdistan Region, Pakistan, Russia, Kazakhstan and Egypt-and two exploration-only countries, Romania and Libya.

For production comparison, the map dataset uses a common FY2024 basis reconstructed from MOL Group's Integrated Annual Report. The eight producing-country values sum to 93.8 kboe/d. Pakistan contributes 5.2 kboe/d on this detailed country reconstruction, ranking fifth of eight producing countries and representing about 5.5% of

the total. This differs slightly from the later Q4 2025 presentation's rounded FY2024 values of 5.3 kboe/d for Pakistan and 93.9 kboe/d for the Group; both are retained with their source/basis stated rather than forced into a false single value.

Country	Current analytical status	FY2024 production (kboe/d)	2P reserves (MMBOE, YE2022)
Hungary	Producing + exploration	36.2	56.5
Croatia	Producing + exploration	21.3	74.4
Azerbaijan	Producing + exploration	12.7	85.2
Iraq / Kurdistan Region	Producing / development	10.3	57.7
Pakistan	Producing + exploration	5.2	12.7
Russia	Producing + exploration	3.5	22.5
Kazakhstan	Producing / development	2.7	23.5
Egypt	Producing + exploration	1.9	2.6
Romania	Exploration only	-	-
Libya	Exploration only	-	-

Strategic interpretation: The spatial view reinforces three points. First, MOL's upstream business is concentrated across Central and Eastern Europe, the Caspian/CIS corridor, the Middle East, South Asia and North Africa rather than being globally dispersed at equal intensity. Second, Pakistan occupies a mid-tier producing position: smaller than Hungary, Croatia, Azerbaijan and the Iraq/KRI exposure, but larger than Russia, Kazakhstan and Egypt on the common FY2024 production basis. Third, Pakistan's production contribution is larger than its YE2022 reserve ranking would suggest, which supports the existing conclusion that reserve replacement, appraisal and timely commercialization remain strategically important if Pakistan is to maintain or improve its relative position inside the MOL portfolio.

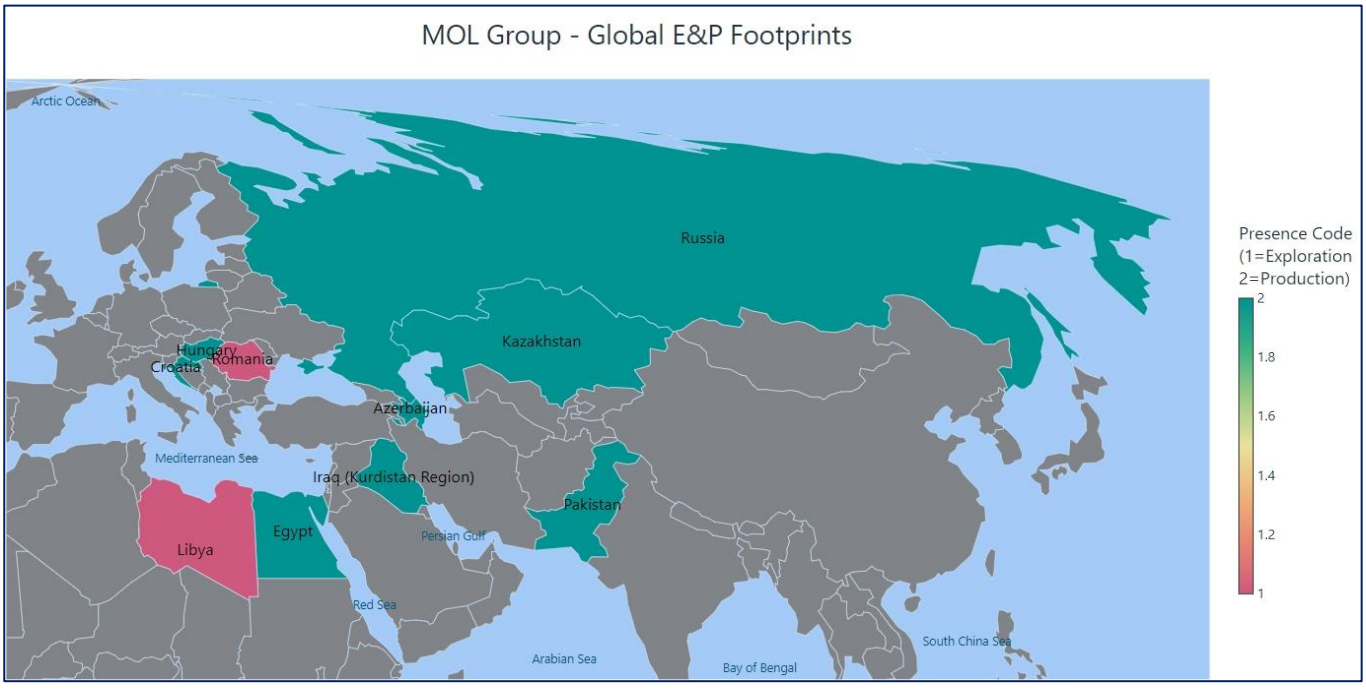


Figure 3-5. MOL Group E&P global E&P footprints.

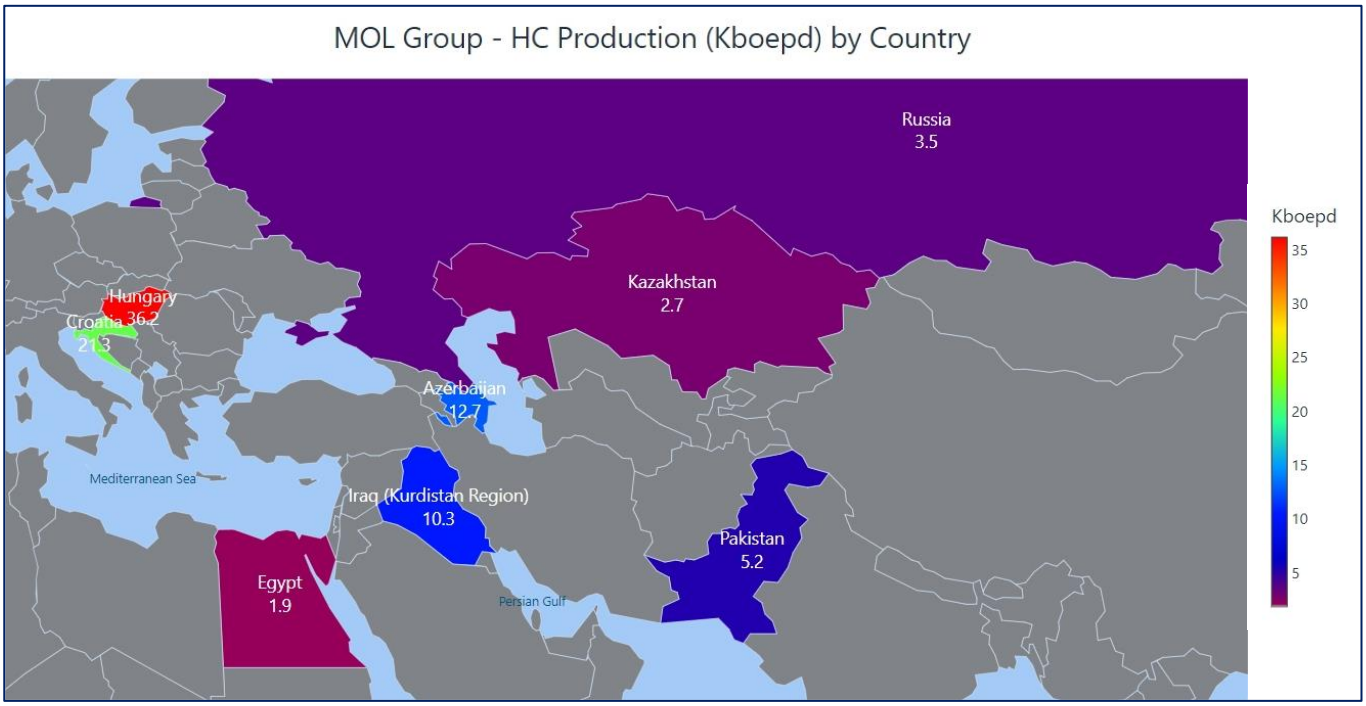


Figure 3-6. MOL Group HC reserve distribution with FY2024 production overlay.

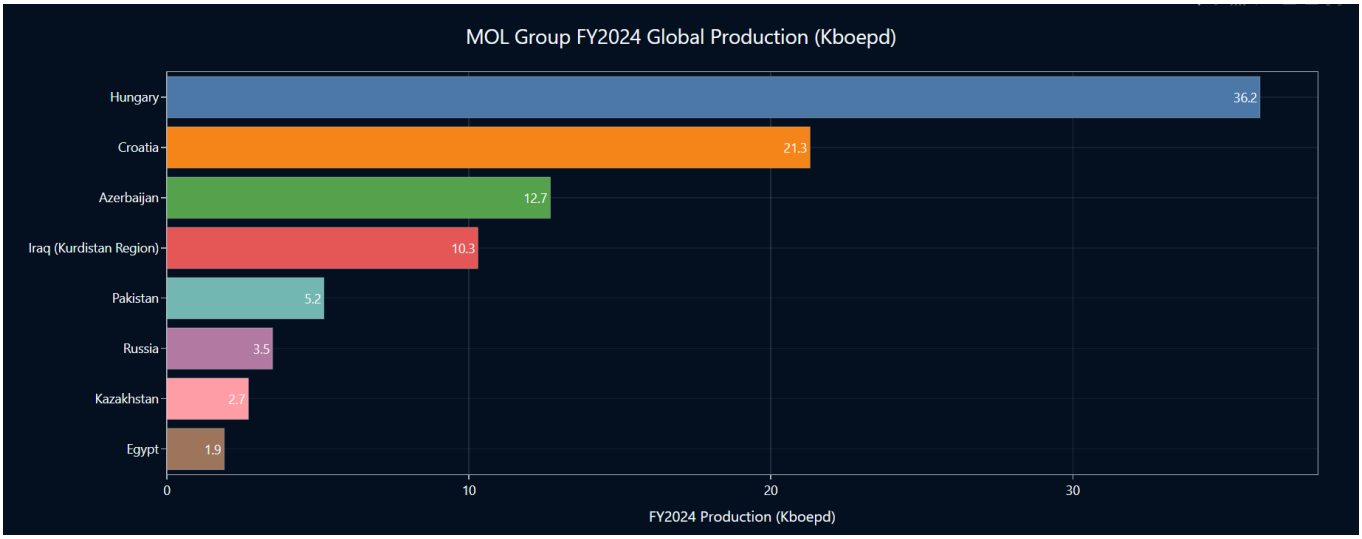


Figure 3-7. Pakistan's position in MOL Group FY2024 HC production.

3.3 Security Resilience, Operating Commitment and Institutional Capability

Security is treated in this synthesis as both an external risk and a demonstrated operating capability. The core Tal-area business is associated with Hangu, Karak and Kohat in Khyber Pakhtunkhwa. As of October 2026, the UK Foreign, Commonwealth & Development Office advises against all travel to these districts because of the wider security environment in parts of KP. Such travel advisories are not corporate operating-risk ratings and does not substitute for MOL's internal security assessment; however, they provide independent evidence that the regional security context is materially more challenging than that of a conventional low-risk operating area.

MOL's own reporting provides more direct evidence. The MOL Group Integrated Annual Report 2023 records an armed attack on the Manzalai-10 wellhead on 22 May 2023 in which six security guards were killed. MOL stated

that the attack was assessed as targeting the uniformed security presence rather than MOL Group itself, and reported subsequent changes to site-protection arrangements. The MOL Group 2023 Half-Year Report also stated that Pakistan production was affected by wells shut in because of water-loading and security issues, while exploration and development work continued in Tal, Margala, Karak and Dera Ghazi Khan.

Table 3-4. Security evidence and strategic interpretation for MOL Pakistan.

Evidence dimension	Public evidence	Strategic interpretation
External regional context	Current UK travel advice lists Hangu, Karak and Kohat among KP districts where it advises against all travel.	Independent indication of elevated regional security exposure; not a substitute for MOL's internal risk rating.
Documented operational incident	MOL Group's 2023 report records the 22 May 2023 armed attack at Manzalai-10 and six security-guard fatalities.	Confirms that security exposure has had direct consequences around an operating asset.
Documented production effect	MOL Group's H1 2023 report states that wells were shut in partly because of security issues.	Shows that security can translate into production continuity and economic exposure.
Continuity and commitment	MOL continued exploration, development, production and portfolio activity in Pakistan and remains committed to existing blocks and further acreage.	Supports an interpretation of long-term operating resilience and commitment rather than risk avoidance.
Analytical boundary	Public sources do not disclose MOL's full security architecture, incident register, cost or internal risk ratings.	The study recognizes resilience without claiming to audit or rank the effectiveness of internal security controls.

Strategic appraisal: MOL Pakistan's long-term success in this environment forms part of the company's value proposition in Pakistan. The capability being demonstrated is broader than physical security: it includes risk governance, local liaison, continuity planning, partner coordination, workforce protection, logistics, stakeholder relationships and the ability to keep investment and technical programmes moving despite episodic disruption. This does not make security risk a positive condition, nor does it imply that all incidents can be prevented. It means that sustained performance under elevated exposure is itself evidence of organizational capability.

Security remains a material downside risk requiring monitoring and linkage to asset value, but MOL's continued presence since 1999, cumulative investment with JV partners, ongoing production and exploration, and adaptation after documented incidents demonstrate a notable level of commitment to Pakistan and resilience in managing a difficult operating environment.

4. Asset Sustainability, Production and Reserve Position

The six-year Energy Yearbook series confirms a material decline in MOL Pakistan's operator-attributed hydrocarbon production, from about 25.2 MMBOE/year in FY2019-20 to 15.5 MMBOE/year in FY2024-25. Figure 4-1 now places that trend beside selected Pakistan E&P peers, adding an important relative perspective: MOL's trajectory is distinctly downward over the period, while peer companies show different patterns of decline, stability or growth. The comparison is not a like-for-like measure of portfolio quality because company asset mixes, working interests, development cycles and reporting bases differ; its value is to show that MOL Pakistan's mature-asset challenge is material both in absolute terms and within the wider domestic E&P context.

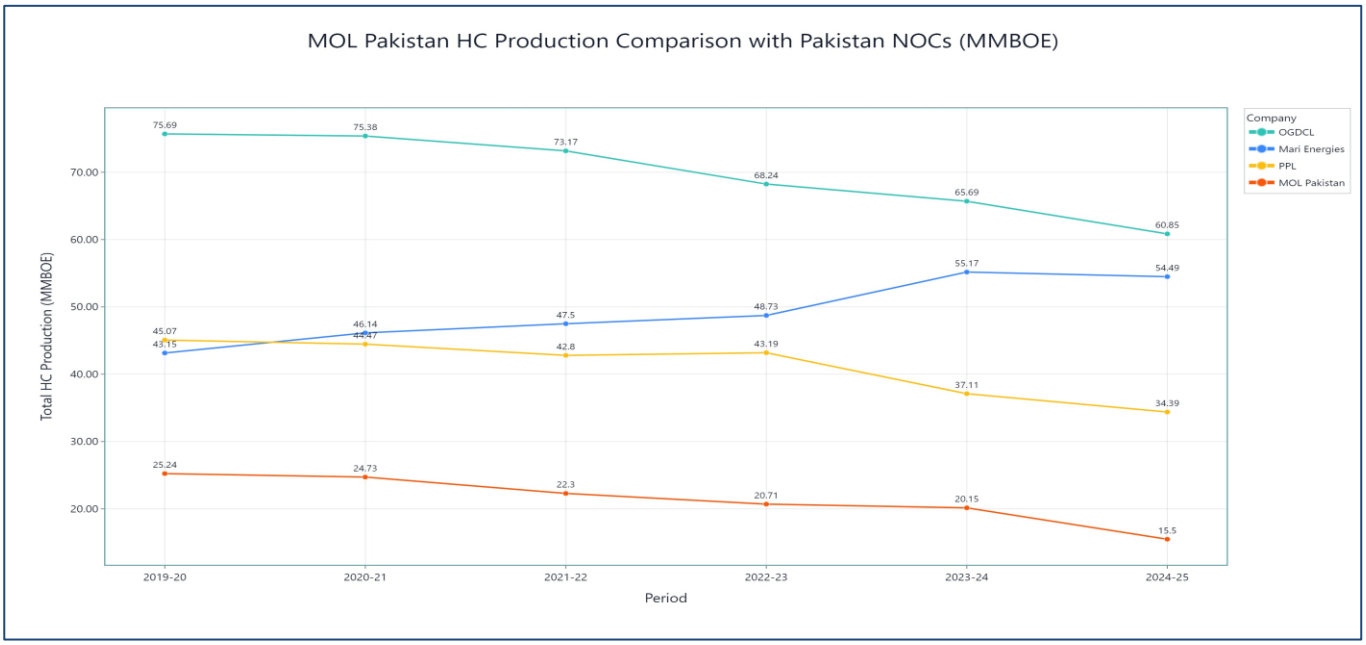


Figure 4-1. MOL Pakistan hydrocarbon-production trend compared with selected Pakistan E&P peers, FY2019-20 to FY2024-25.

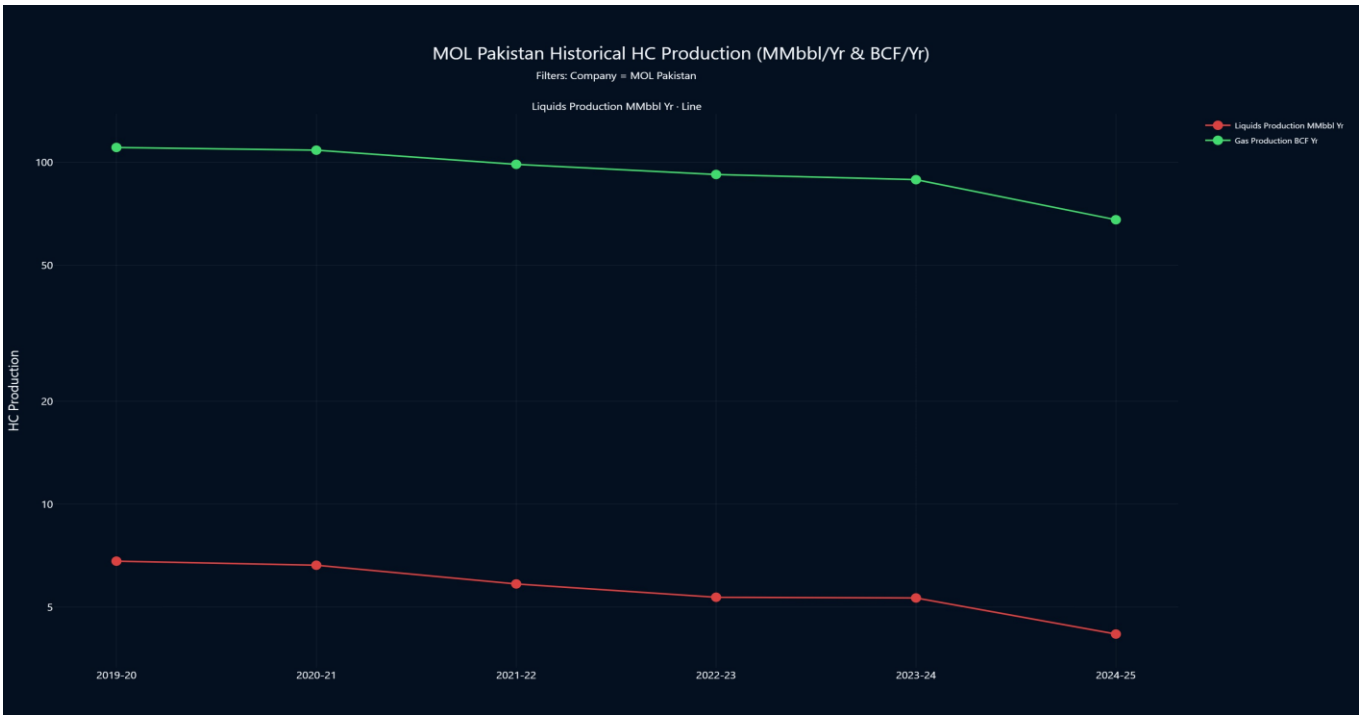


Figure 4-2. MOL Pakistan historical liquids and gas production, FY2019-20 to FY2024-25.

Figure 4-2 separates MOL Pakistan's liquids and gas streams in their reported physical units. Both decline through the period, so the overall fall is not simply a change in product mix: liquids decrease from about 6.82 MMbbl/year to 4.17 MMbbl/year, while gas falls from about 110.6 BCF/year to 68.0 BCF/year. The broadly parallel direction is consistent with a mature producing system in which natural depletion, field-development timing, compression/optimization requirements, curtailment and evacuation/offtake conditions all become strategically important.

4.1 Remaining 2P Reserve Distribution

Figures 4-3 and 4-4 expand the reserve discussion beyond the remaining balance alone by showing, field by field, the relationship between original 2P reserves, cumulative production and the remaining 2P balance at 30 June 2025. On the Yearbook operator-attributed basis, the current aggregation contains approximately 14.041 MMbbl of remaining oil 2P and 489.27 BCF of remaining gas 2P. For oil, Makori East retains the largest remaining balance at about 6.62 MMbbl, followed by Mardankhel, Maramzai and Makori Deep. The three-panel presentation also makes depletion maturity visible: fields with substantial original reserves and cumulative production may now carry materially smaller remaining balances, while fields with lower cumulative offtake can retain a larger proportion of their original 2P.

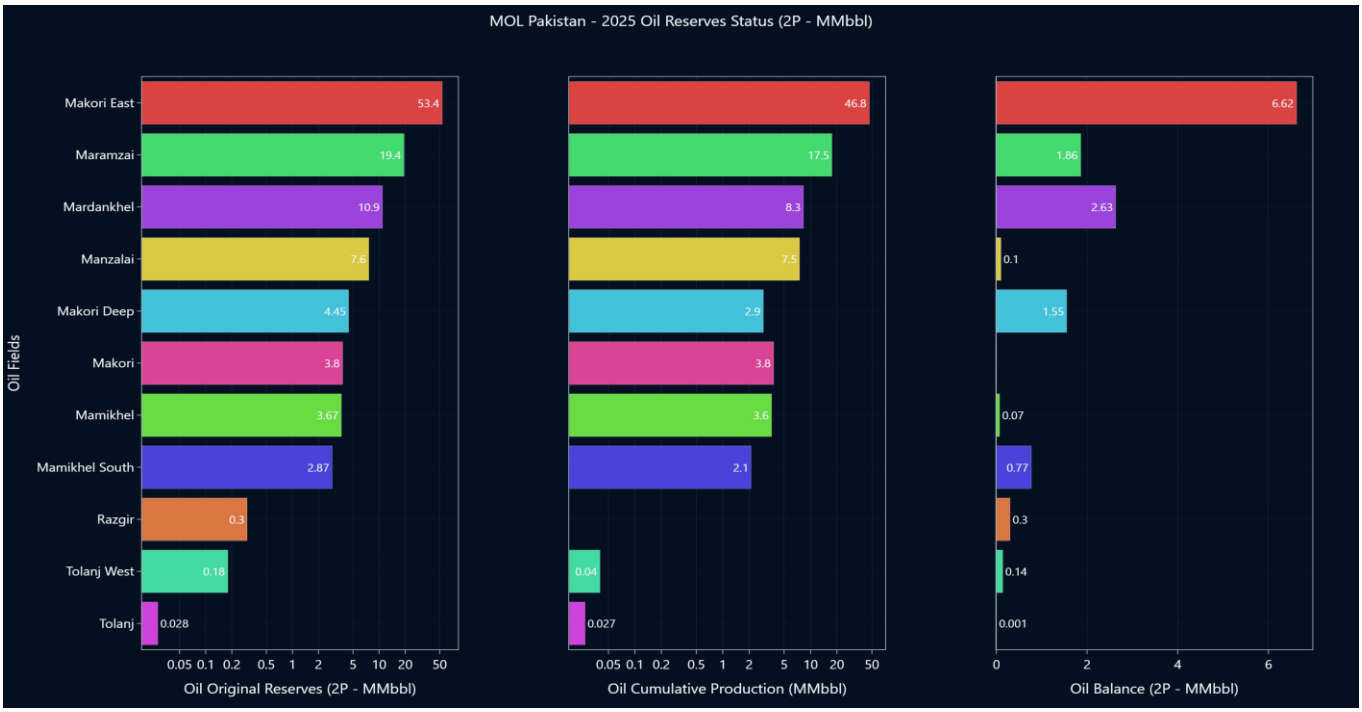


Figure 4-3. MOL Pakistan-operated field Oil 2P status: original reserves, cumulative production and remaining balance at 30 June 2025.

The gas portfolio shows the same need to distinguish original resource scale from remaining inventory. Makori East carries about 157.5 BCF of remaining gas 2P and Maramzai about 126.0 BCF, followed by Razgir, Mardankhel and Tolanj West. Figure 4-4 shows that field ranking changes depending on whether the comparison is made on original 2P, cumulative gas production or remaining 2P. This is strategically important: large historical producers are not necessarily the fields with the largest remaining growth option, and reserve concentration is interpreted together with depletion history and current production capability.

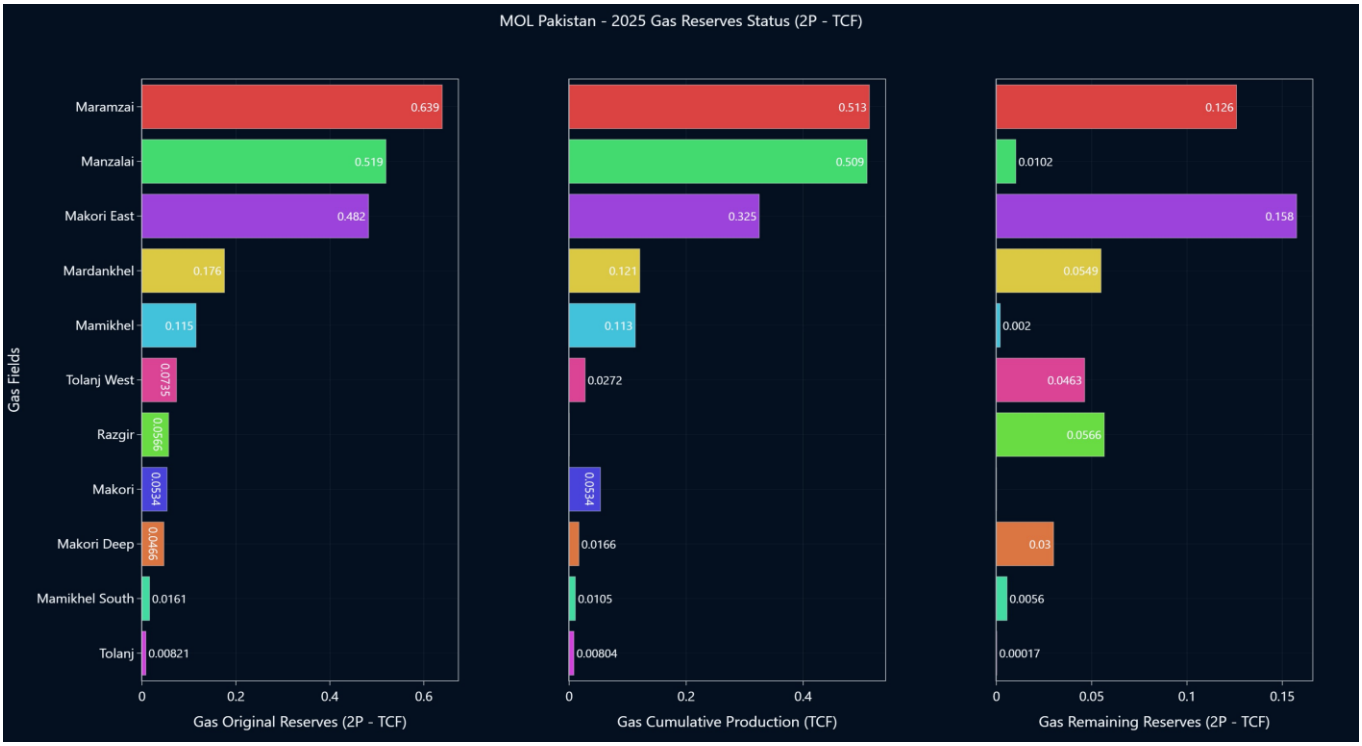


Figure 4-4. MOL Pakistan-operated field Gas 2P status: original reserves, cumulative production and remaining balance at 30 June 2025.

4.2 Strategic Interpretation

- Reserve replacement and production stabilization remain core strategic objectives, but the revised figures show that they are evaluated field by field against original resource scale, cumulative depletion and remaining 2P rather than from remaining balance alone.
- Field concentration still increases the value of asset-specific risk intelligence; however, prioritize exposure using a combined view of remaining reserves, current production, depletion maturity and development/ commercialization potential.
- The domestic peer comparison adds context to the production decline: MOL Pakistan's downward trend is material, but peer trajectories also reflect different portfolios and investment cycles. Benchmarking is most useful for identifying questions, not for assigning simple performance rankings.
- Production curtailment, evacuation/offtake constraints, security, community access and regulatory risks need lnkage to the specific fields and volumes they can affect, because monetization depends on both subsurface potential and continuity of operations.

4.3 Indicative Economic Screening and Business-Impact Analysis

The purpose of this section is to connect production, reserves, capital allocation and non-technical risk to business value without implying a precision that the public data cannot support. The scope is strategic economic screening rather than field- or project-level valuation. MOL Pakistan's standalone realized prices, field-level OPEX, tax and royalty burden, working-interest cash flows, development and abandonment liabilities, approved production forecasts, financing assumptions and corporate hurdle rates are not publicly available in sufficient detail to support defensible point-forward or full-life economics. The analysis remains at the level of indicative economic screening and business-impact materiality: published physical quantities are held separate from transparent scenario assumptions, and no internal MOL financial input is inferred silently.

Table 4-1. Selected Pakistan contribution indicators and interpretation boundaries.

Metric	Pakistan indicator	Calculation / basis	Interpretation boundary
FY2025 production share	4.5%	4.3 kboe/d / 94.7 kboe/d	MOL Group entitlement-production basis.
YE2024 published 2P reserve share	~3.5%	11.2 / 316 MMBOE	Indicative; reporting/consolidation scope requires confirmation before accounting attribution.
FY2025 upstream CAPEX share	~1.8%	US$6.8m / US$385m	One-year organic upstream CAPEX flow; not a measure of asset value.
Pakistan cumulative investment	US$2.8bn	MOL Pakistan figure with JV partners	Historical cumulative commitment; not comparable to one-year CAPEX.

The relative shares suggest that Pakistan remains an economically relevant producing position even though FY2025 capital allocation was modest compared with Group upstream CAPEX. This can reflect portfolio maturity, project timing and the episodic nature of exploration/development spend; it is not evidence of underinvestment on its own. However, it is a useful management signal: production share, reserve share, reserve replacement and CAPEX share should be tracked together rather than in isolation.

4.3.1 Basis and Rationale for the Screening Scenarios

These calculations are order-of-magnitude screening proxies, not estimates of MOL Pakistan revenue, EBITDA, cash flow, lost profit, NPV, IRR or asset value. The modelling hierarchy is deliberately conservative: public physical volumes and reserves are used where available; unsupported ownership, cost, fiscal, timing and financing inputs are not invented; and uncertainty is shown through transparent ranges rather than a single precise answer. The resulting values are best described as gross-value exposure or sensitivity, not company economics. This treatment is intentional because the document's purpose is strategic synthesis and decision support, while the official variables required for point-forward and full-life petroleum economics remain outside the available public evidence base.

The production-decline materiality and curtailment screens use US$70, US$90 and US$110 per BOE as low, central and high gross-value-equivalent cases. These are not forecasts of crude-oil price, as MOL realized prices, or as implying that a BOE of gas has the same market value as a barrel of liquids. They are standardized mixed-hydrocarbon screening equivalents selected to reflect the 2025-26 commodity-price regime and the unusually wide geopolitical and supply-disruption risk range visible in 2026. The U.S. Energy Information Administration's October 2026 Short-Term Energy Outlook places Brent at about US$96/bbl on average in 2026 and US$84/bbl in 2027, after a September 2026 average near US$114/bbl during Middle East supply disruptions. The World Bank's April 2026 Commodity Markets Outlook used a US$86/bbl 2026 baseline and identified an approximately US$95-115/bbl range under more extensive conflict-related disruption. Against that context, US$70/BOE represents a normalization/downside case, US$90/BOE a central screening case, and US$110/BOE an elevated-disruption case. The range is a transparent materiality envelope, not a commodity-price forecast, and can be replaced by product-specific oil, gas, condensate and LPG realizations/netbacks when official data are available.

For consistency across the indicative screening, the remaining-reserve materiality screen also uses US$70, US$90 and US$110 per BOE as low, central and high gross-value-equivalent cases. This does not turn the reserve calculation into a valuation or a netback estimate. Reserves are not immediately monetizable and would require future development and operating expenditure, fiscal payments, transport/processing, abandonment and time to production. The calculation is deliberately presented as an undiscounted gross-value envelope only. The 6 mcf = 1 BOE conversion is a physical energy-equivalent convention and does not imply that one BOE of gas has the same realized economic value as one barrel of liquids.

Calculation basis used in the indicative economics

The screening calculations below are intentionally simple and reproducible. They use public physical volumes and the same US$70/90/110 per BOE low/central/high gross-value-equivalent scenarios described above. Their purpose is to show strategic materiality, not to reproduce MOL Pakistan's internal petroleum economics.

Production-decline materiality:

Endpoint annual production-rate gap = 25.2 - 15.5 = 9.7 MMBOE/year.
Elapsed period = five annual intervals from FY2019-20 to FY2024-25.
Average linear reduction in the annual production rate = 9.7 ÷ 5 = 1.94 MMBOE/year per year; compound annual

decline ≈ 9.3%/year.
Endpoint annualized gross-value materiality = 9.7 MMBOE/year × scenario gross-value equivalent.
US$70/BOE: 9.7 × 70 = US$679 million/year; US$90/BOE: 9.7 × 90 = US$873 million/year; US$110/BOE: 9.7 × 110 = US$1.067 billion/year.
Linearized average annual erosion screen = 1.94 × scenario gross-value equivalent: approximately US$136 million, US$175 million and US$213 million of additional annual gross-value capacity lost per year of elapsed time under the US$70/90/110 cases.
Interpretation: the 9.7 MMBOE/year figure is the difference between the two endpoint annual production rates, not an annual decline rate. Neither screen represents lost revenue; both are strategic materiality comparisons showing the scale of production capacity that would need to be replaced, stabilized or partially offset as mature assets decline.

Curtailment / deferred-production materiality:

Deferred volume (BOE) = curtailment rate (kboe/d) × 1,000 × duration (days).
Gross-value exposure = deferred volume × scenario gross-value equivalent (US$/BOE).
At the central US$90/BOE case and 365 days: 1 kboe/d = US$32.85 million/year; 3 kboe/d = US$98.55 million/year; 5 kboe/d = US$164.25 million/year. Across US$70-110/BOE, the corresponding ranges are approximately US$25.55-40.15 million, US$76.65-120.45 million and US$127.75-200.75 million/year.
Interpretation: fully deferred production may be recovered later; where it is recovered, the economic effect is primarily timing, price differential and incremental cost rather than the full gross-value amount.

Remaining-reserve gross-value materiality:

Gas energy-equivalent = (489.27 × 10^6 Mcf) ÷ 6 Mcf/BOE = 81.545 MMBOE.
Standardized remaining reserve base = 14.041 MMbbl liquids + 81.545 MMBOE gas = 95.586 MMBOE.
Undiscounted gross-value screen = standardized reserve base × scenario gross-value equivalent.
US$70/BOE: 95.586 × 70 = US$6.691 billion; US$90/BOE: 95.586 × 90 = US$8.603 billion; US$110/BOE: 95.586 × 110 = US$10.514 billion.
Interpretation: these amounts are not reserve values, NPV or realizable proceeds. They are gross energy-equivalent materiality envelopes before ownership, product-specific pricing, CAPEX, OPEX, fiscal terms, timing and discounting.

Key assumptions and exclusions. Volumes are operator-attributed/gross rather than MOL equity volumes; 6 mcf = 1 BOE is used only as a physical energy-equivalent conversion; US$70/90/110 per BOE are mixed-hydrocarbon screening equivalents rather than realized oil or gas prices; annualized curtailment examples assume 365 days; 1 kboe/d = 1,000 boe/d; no working interest, product mix, price differentials, royalty/tax, CAPEX, OPEX, transportation/processing, abandonment, financing, inflation, production timing or discount rate is applied. These calculations support strategic screening only.

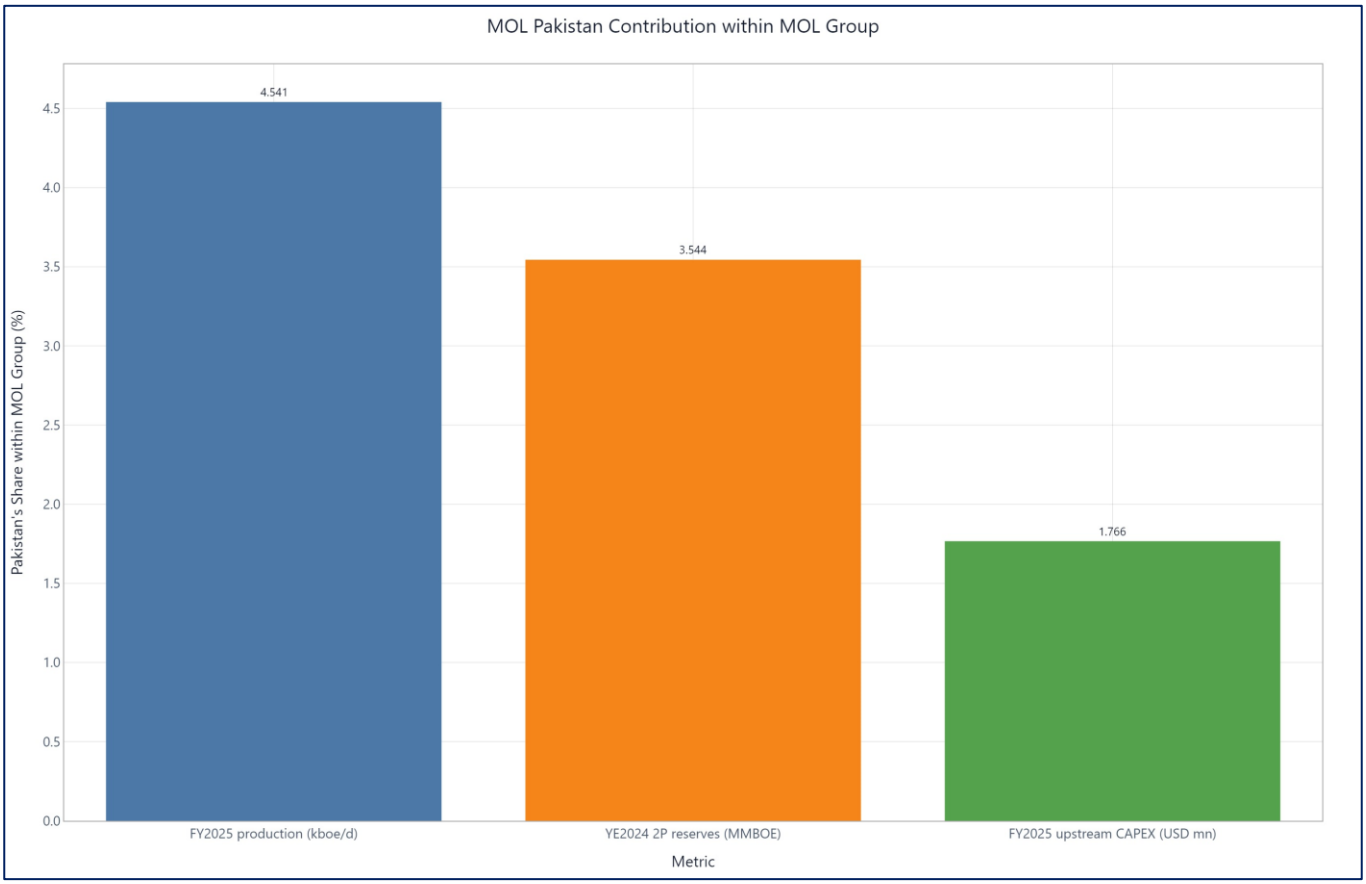


Figure 4-5: Pakistan's relative contribution across selected MOL Group metrics.

4.3.2 Endpoint Production-Rate Gap, Average Decline and Gross-Value Sensitivity

The operator-attributed standardized production series falls from about 25.2 MMBOE/year in FY2019-20 to 15.5 MMBOE/year in FY2024-25. The two endpoint annual production rates differ by roughly 9.7 MMBOE/year. That figure is an endpoint rate gap, not the average annual rate of decline. Because the period contains five annual intervals, the simple linear average reduction in the annual production rate is about 1.94 MMBOE/year per year; equivalently, the endpoint series implies a compound annual decline of about 9.3% per year. This distinction matters analytically. The 9.7 MMBOE/year gap answers 'how much lower is the current annual production rate than the FY2019-20 rate?', whereas the 1.94 MMBOE/year-per-year measure answers 'how quickly did the annual production rate decline on average over the interval'? Neither represents 'lost production' or output that necessarily had to be maintained. Petroleum assets naturally deplete and mature over time, while reservoir performance, development timing, compression requirements, curtailment and other operating factors also influence the trajectory. For strategic materiality, applying US$70, US$90 and US$110 per BOE to the 9.7 MMBOE/year endpoint gap gives annualized gross-value magnitudes of approximately US$679 million, US$873 million and US$1.067 billion. Applying the same cases to the 1.94 MMBOE/year linearized average yearly erosion gives approximately US$136 million, US$175 million and US$213 million of additional annual gross-value capacity lost per year of elapsed time. Because the volumes are gross/operator-attributed rather than MOL equity volumes, neither calculation can be translated directly into MOL revenue.

4.3.3 Curtailment and Deferred-Production Screening

Curtailment converts a technical production-capacity issue into an economic timing and cash-realization issue. The first distinction is whether volumes are permanently lost or merely deferred. If production is recovered later, the economic effect is not the full gross value of the deferred volume; it is primarily the time value of cash, any

difference in realized price, incremental operating/compression cost and any volume ultimately unrecovered. Figure 4-7 presents a two-dimensional sensitivity: three deferred-production rates (1, 3 and 5 kboe/d) are tested against the low, central and high US$70/90/110 per BOE screening equivalents. At US$90/BOE and a full-year duration the respective gross-value magnitudes are approximately US$32.9 million, US$98.6 million and US$164.3 million; across the full scenario range they span about US$25.6-40.2 million, US$76.7-120.5 million and US$127.8-200.8 million per year. These are escalation/materiality screens, not booked lost revenue.

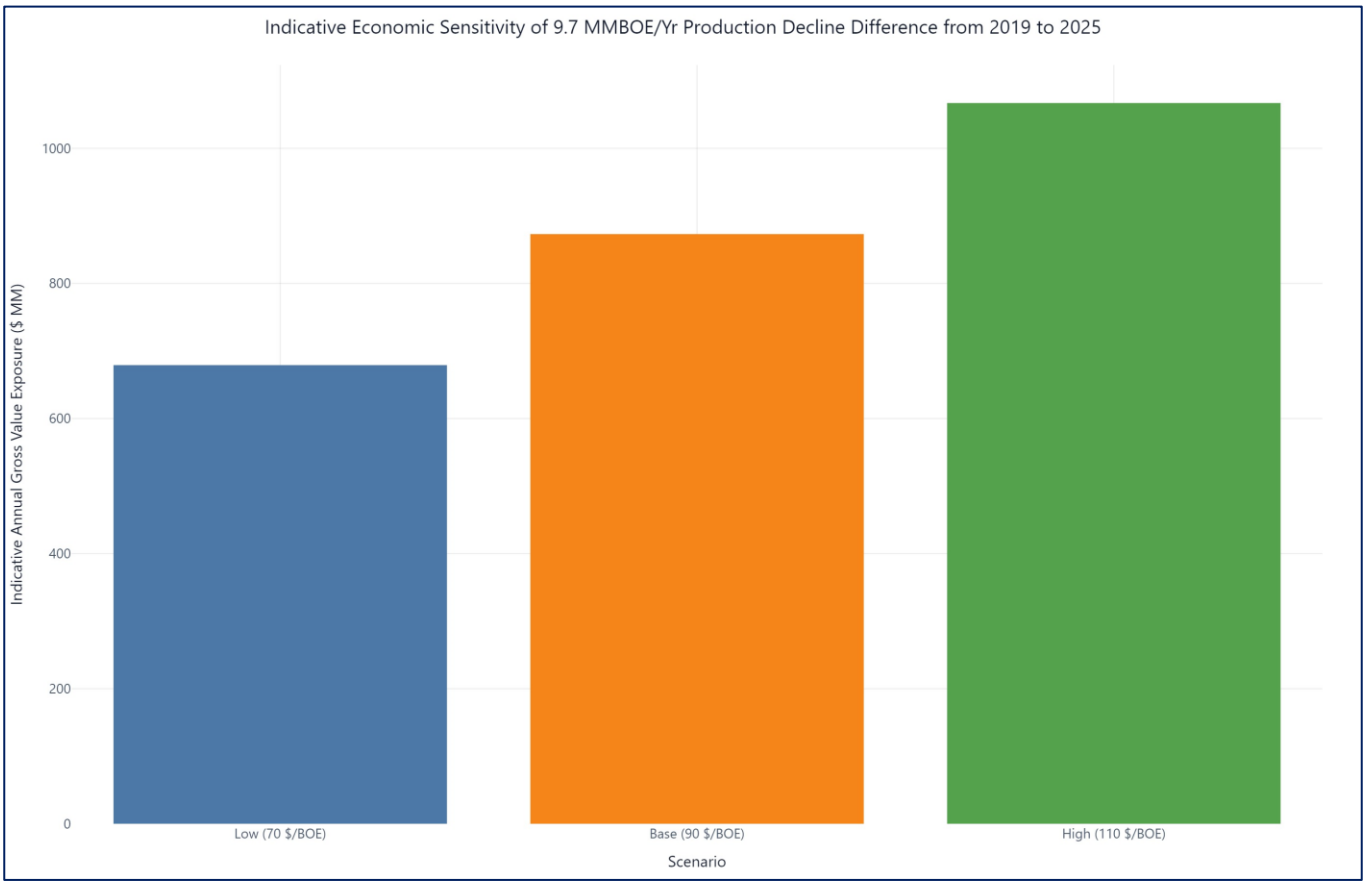


Figure 4-6. Illustrative gross-value sensitivity of the FY2024-25 endpoint annual production-rate gap relative to FY2019-20.

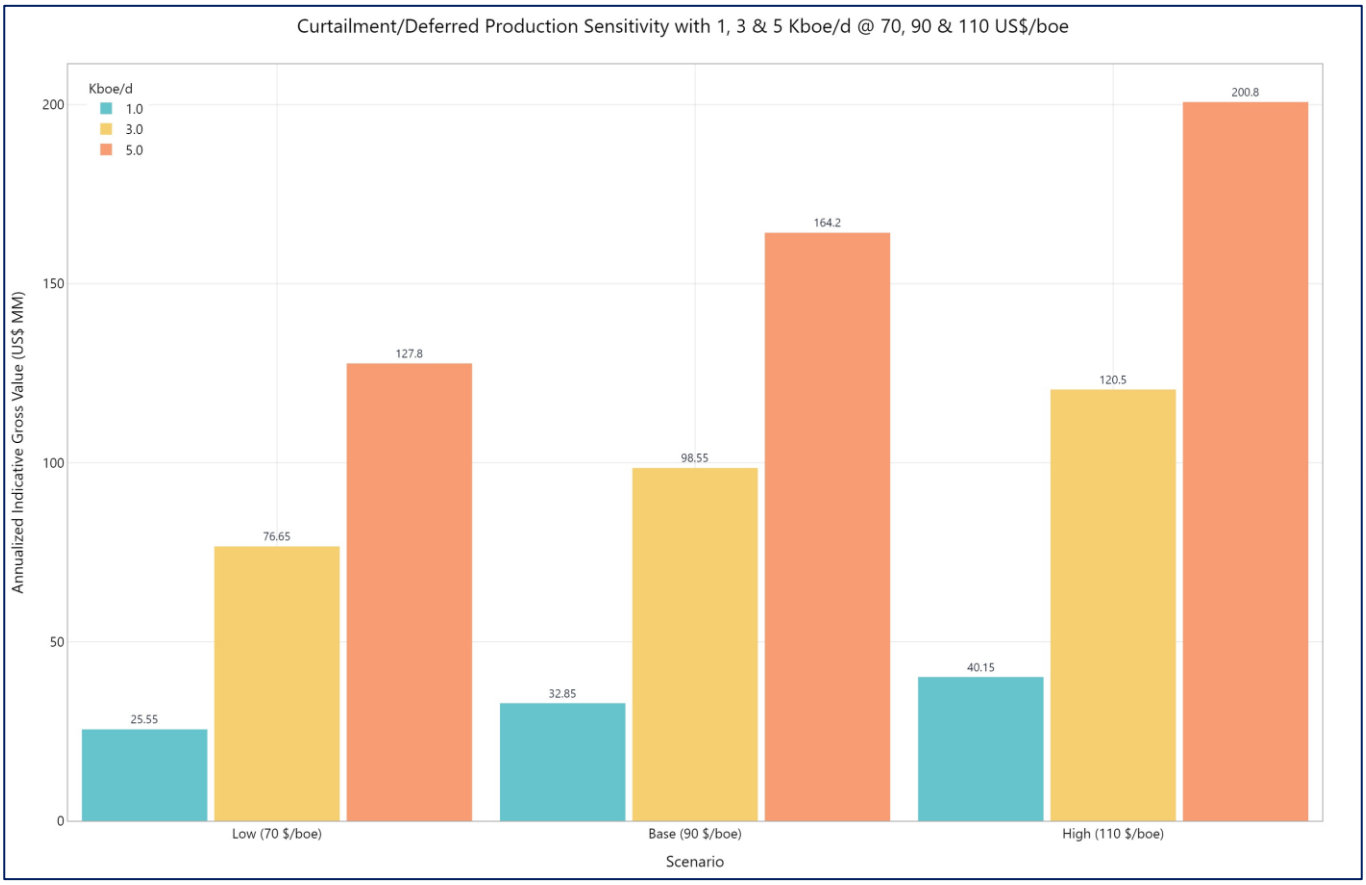


Figure 4-7. Curtailment / deferred-production gross-value sensitivity for 1, 3 and 5 kboe/d across US$70/90/110 per BOE scenarios.

The figure compares three physical curtailment cases (1, 3 and 5 kboe/d) across the full US$70, US$90 and US$110 per BOE screening range, rather than showing only the central case. The resulting annualized gross-value envelopes are approximately US$25.6-40.2 million for 1 kboe/d, US$76.7-120.5 million for 3 kboe/d and US$127.8-200.8 million for 5 kboe/d. For a real event, substitute actual duration, MOL equity/entitlement, product-specific realized netback and the fraction ultimately unrecovered; fully deferred volumes should be assessed mainly for timing, price and incremental-cost effects rather than treated automatically as permanently lost revenue.

4.3.4 Remaining-Reserve Gross-Value Sensitivity

The Yearbook-based operator-attributed reserve aggregation contains about 14.041 MMbbl oil plus 489.27 BCF gas. Using the simple 6 mcf = 1 BOE physical conversion adopted elsewhere in the analytical dataset gives a standardized gross reserve base of about 95.586 MMBOE. Applying the same illustrative US$70, US$90 and US$110 per BOE gross-value-equivalent scenarios used in the production and curtailment screens produces undiscounted gross materiality proxies of approximately US$6.691 billion, US$8.603 billion and US$10.514 billion. These are not reserve valuations and are not comparable with audited asset values: they ignore working interest, product-specific pricing, recovery timing, development CAPEX, OPEX, fiscal terms, abandonment, price differentials and discounting.



Figure 4-8. Illustrative undiscounted gross-value sensitivity of the standardized remaining operator-attributed reserve base.

4.3.5 CSR and Social-Investment Economics

Economic discipline also applies to social investment, but the objective is cost-effectiveness and durable outcomes rather than financial return alone. The current public project register allows only a few simple unit-cost examples. Do not rank these across unlike intervention types; their value is in establishing a reproducible measurement approach.

Table 4-2. Illustrative CSR unit-cost indicators from publicly disclosed projects.

Project	Disclosed basis	Simple unit-cost indicator	Interpretation boundary
Four Tal Block eye camps	PKR 1.55m; >2,000 patients	≤PKR 775 per documented patient	Actual unit cost is lower if beneficiaries exceeded 2,000; outcome quality and surgery/referral results matter.
Women's vocational centre, Lachi	PKR 2.5m; 100 students	PKR 25,000 per enrolled student	Supplement with completion, employment and income outcomes.
Gurguri-Banda Daud Shah road	PKR 400m JV assistance; 40 km	~PKR 10m per km	JV-funded infrastructure; per-km cost is not a beneficiary-impact measure.

A mature CSR economics dashboard combine cost per verified beneficiary or functioning asset with post-handover functionality, inclusion, satisfaction, grievance trends and outcome persistence. Where monetization is defensible, an SROI-style calculation may be added, but non-market social and environmental outcomes need not be forced into a monetary value merely to create a ratio.

4.3.6 What is Required for a Full Petroleum-Economics Model

Table 4-3. Minimum inputs required for a full petroleum-economics model.

Required input	Minimum economic-model detail
Production forecast	Field/project annual oil, gas, condensate and LPG volumes; plateau/decline; downtime and curtailment assumptions
Prices and realizations	Product-specific realized prices, gas pricing formula, condensate/LPG differentials and escalation basis
Working interest and entitlement	MOL equity/working interest, cost-recovery or entitlement basis where relevant
CAPEX	Exploration, development, facilities, compression, workovers, sustaining and abandonment CAPEX
OPEX	Fixed/variable operating cost, transportation, processing, tariffs and overhead treatment
Fiscal terms	Royalty, taxes, levies, depreciation, ring-fencing, incentives and applicable petroleum-policy terms
Timing and financing	Project schedule, first production, payment/receivable timing, FX and repatriation assumptions
Discount rate / hurdle rate	Corporate or project-specific WACC / hurdle rate and inflation basis

Once these inputs are available, the Brill-Viz economics module can calculate point-forward and full-life cash flow, NPV, IRR, payout, breakeven price, unit technical cost, value-of-information for exploration/appraisal decisions and scenario sensitivities. Point-forward economics would require official future production, price/realization, working-interest, CAPEX, OPEX, fiscal, timing and discount-rate inputs; full-life economics would additionally require reliable historical investment and cash-flow information. Those inputs are not available at the level required for this public-data synthesis, and detailed asset economics are not part of the document's intended scope. Until such data are available, the present paper deliberately remains at strategic economic sensitivity rather than pseudo-precision.

4.3.7 Recommended Economic Decision Dashboard

When all required data would be available, a dashboard may be created with:

- Pakistan share of MOL Group production, reserves and upstream CAPEX.
- Production decline, uptime, curtailment days and deferred-volume estimate.
- Gross value sensitivity of deferred production under low/base/high price assumptions.
- Reserve replacement ratio and standardized reserve-life trend.
- Development CAPEX per incremental BOE and exploration spend per discovered/appraised BOE where data permit.
- Receivables, FX/repatriation exposure and major fiscal/regulatory value-at-risk items.
- CSR cost-effectiveness metrics linked to verified outcomes rather than expenditure alone.
- Financial and monetary outcomes with sensitivity analysis

4.3.8 Economics interpretation rule

The screening result is hypothetical about materiality, not a conclusion about value. Every scenario states its physical basis, formula, assumed value range, exclusions and the company-specific inputs required to replace the proxy. Full project economics cannot be worked out unless production forecasts, realized pricing, ownership, CAPEX, OPEX, fiscal terms, timing, abandonment and an appropriate discount rate are available.

5. Pakistan Energy, Political and Regulatory Risk

Pakistan's upstream risk environment combines conventional E&P uncertainty with policy, fiscal, gas-market, foreign-exchange, infrastructure, environmental, security and intergovernmental dimensions. The completed Energy synthesis provides the national context; the MOL project narrows that context to the issues that can materially affect MOL Pakistan's assets and decisions.

MOL Group already operates a mature, comprehensive Enterprise Risk Management system as part of its corporate-governance structure. Public MOL Group disclosures state that significant risks are identified, assessed, evaluated, treated and monitored across business and functional units, geographies and projects, with regular reporting to top management and the Board of Directors. The Political-Regulatory-Community Risk Observatory proposed in this study is not a replacement risk system; it is a Pakistan-focused analytical view that could be mapped into the existing ERM architecture to make local triggers, asset exposure, stakeholder consequences, mitigation and opportunity more visible for this synthesis.

Recent regulatory developments reinforce the need for structured monitoring. SECP has adopted IFRS S1 and IFRS S2 sustainability disclosure standards in phases, while its revised ESG Disclosure Guidelines for listed companies align reporting with the Pakistan Green Taxonomy. In the petroleum sector, current reform discussions and pricing/deregulation initiatives can change market incentives and commercial exposure. The precise impact on an upstream operator must be assessed issue by issue rather than assumed.

Table 5-1. Pakistan upstream risk themes, exposure indicators and response architecture.

Risk theme	Potential MOL exposure	Suggested KRI / trigger	Response architecture
Gas commercialization / curtailment	Delayed monetization; production deferral; cash-flow impact	Curtailment days; offtake nominations; realized production vs capacity	Commercial/regulatory engagement; scenario analysis; facility optimization.
Fiscal / petroleum-policy change	Project economics and investment thresholds	Effective tax/royalty/fiscal change; licence terms	Economic impact model and decision-gate review.
FX / repatriation / macro stress	Cost, cash conversion and investment flexibility	FX availability; receivables; remittance restrictions	Currency exposure analysis; liquidity planning; stakeholder dialogue.
Environmental compliance	Permitting, remediation and project schedule	Permit milestones; incidents; non-compliance observations	Early EIA/EMP integration; assurance and corrective-action tracking.
Security / access	People, logistics, drilling and field continuity	Security events; access closures; convoy / road restrictions	Security plan, local liaison and contingency routing.
Community expectations / grievances	Access, reputation, delay and social licence	Open grievances; closure time; repeat issues; disruption days	Stakeholder mapping, grievance SLA, targeted intervention and escalation.

5.1 Security risk as both exposure and demonstrated resilience

The risk register should retain security/access as a core business-continuity category, but the interpretation should be two-sided. Security events can affect people, logistics, field access, drilling and production; equally, MOL Pakistan's documented continuity of operations in a security-sensitive environment is evidence of adaptive capacity. Accordingly, security KPIs are better read alongside continuity outcomes such as safe operating days, access availability, disruption duration, recovery time and delivery of planned exploration/development milestones.

5.1.1 Relationship to MOL Group ERM

The study benefits from distinguishing three different questions: whether a Group-level risk process exists; whether Pakistan-specific risks are represented within that process; and whether public evidence is sufficient for an external researcher to see the asset-level linkage. Public evidence strongly supports the first point. The second and third cannot be fully assessed from external sources alone. Consequently, references in this paper to risk registers, KRIs, ownership or escalation must be read as proposed analytical fields for validation against MOL's existing internal ERM processes, not as evidence that such controls are absent.

5.2 Risk-to-opportunity principle

The synthesis does not assume that every external risk can be eliminated. The more practical objective is to improve early warning and response quality. Regulatory change can create first-mover opportunities for companies that

adapt quickly; community investment can strengthen trust when it responds to verified needs; and environmental efficiency can reduce both compliance risk and operating cost. The analytical question is not only 'what can go wrong', but 'what response converts exposure into resilience or strategic advantage'?

6. Community Intelligence and Social Licence

The current community dataset provides a first verified screening layer for Karak, Hangu, Kohat, Islamabad and Dera Ghazi Khan. It combines Census-2023 population and household structure with literacy and district-level water-source indicators, and adds 2023-24 wheat/agriculture variables where available.

The five areas do not constitute a single community profile. They differ significantly in urbanization, literacy, water access and agricultural dependence. In practical terms, the social-investment logic for rural Tal-area communities needs to differ from peri-urban Islamabad/Margala, while Dera Ghazi Khan requires a separate baseline because the public MOL-specific CSR record is currently sparse.



Figure 6-1. Population, Literacy and improved-water access in MOL-relevant screening areas.

Hangu has the lowest literacy rate in the current screening set, while Karak has the largest gap in improved-water access. Islamabad performs strongly on both measures at district level, but the ICT average may mask pockets of peri-urban need around specific operational or stakeholder locations.

6.1 Agriculture and livelihood context

Agricultural indicators help interpret livelihood dependence rather than determine CSR priorities by themselves. Dera Ghazi Khan is a much larger wheat-producing district than the three Tal-area districts in the current dataset. Karak has a particularly low 2023-24 wheat yield in the present extract, while Hangu and Kohat remain below Islamabad and Dera Ghazi Khan.

6.2 Community intelligence still missing

The current data are sufficient for first-pass screening but not yet for a defensible composite need score. The remaining priority variables are district/subdistrict poverty or deprivation, health-service access, school access,

broader crop/livestock dependence, climate hazards, rainfall/drought/flood metrics and more precise field/village proximity. Calculate the Community Need and Investment Priority Index only after these variables are added or explicitly omitted with revised weights.

GIS context - National drinking-water access

The district screening above can be viewed within the wider national pattern. Census-2023 provincial aggregation shows substantially stronger improved-water access in Punjab and Islamabad than in Khyber Pakhtunkhwa and Balochistan. For MOL Pakistan, this map is contextual rather than asset-specific: the Tal-area districts still require assessment using the district values already used in Figures 6–7, while the provincial pattern helps explain why water remains a strategically relevant CSR and community-resilience theme.

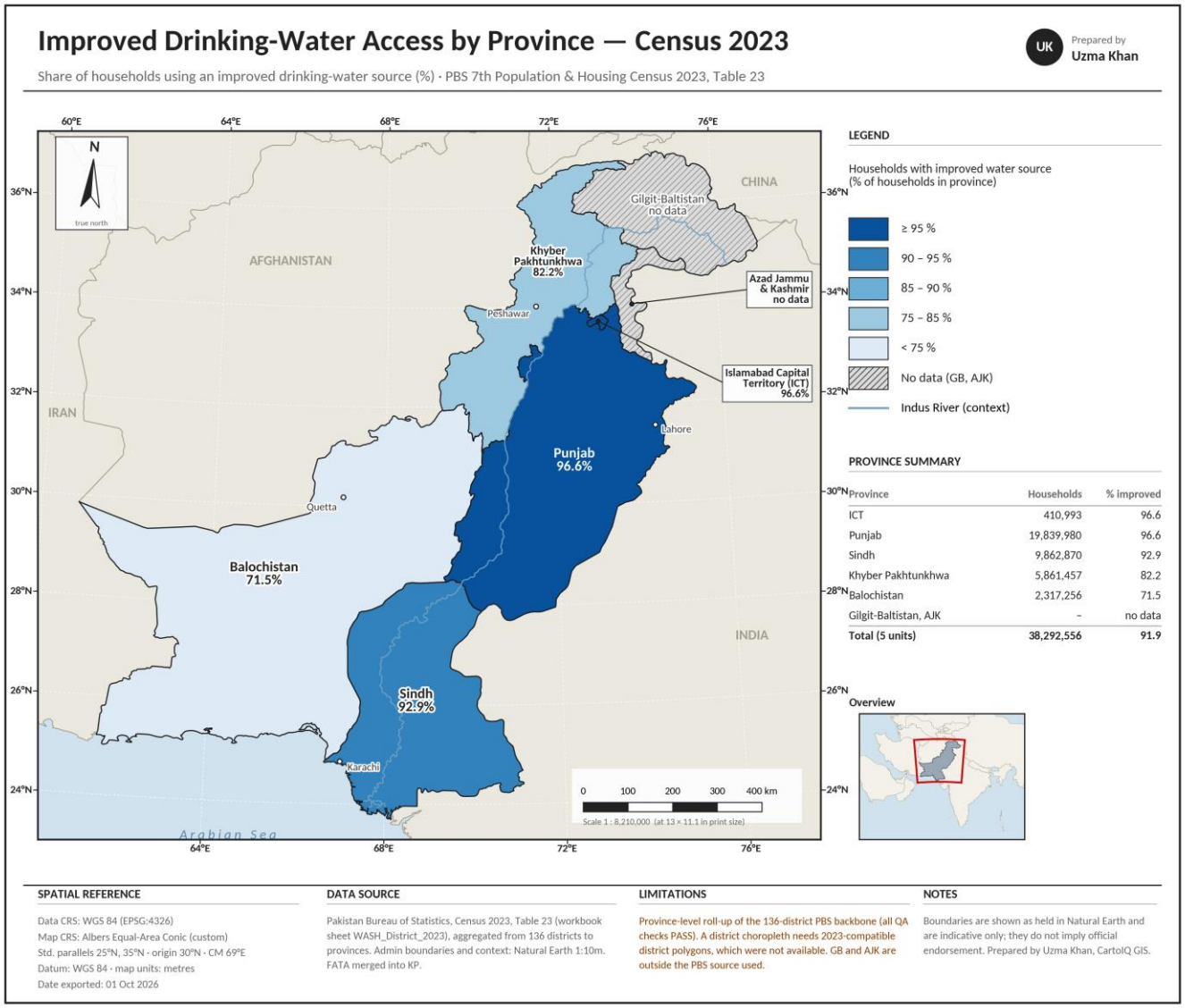


Figure 6-2. Improved drinking-water access by province, Pakistan Census 2023.

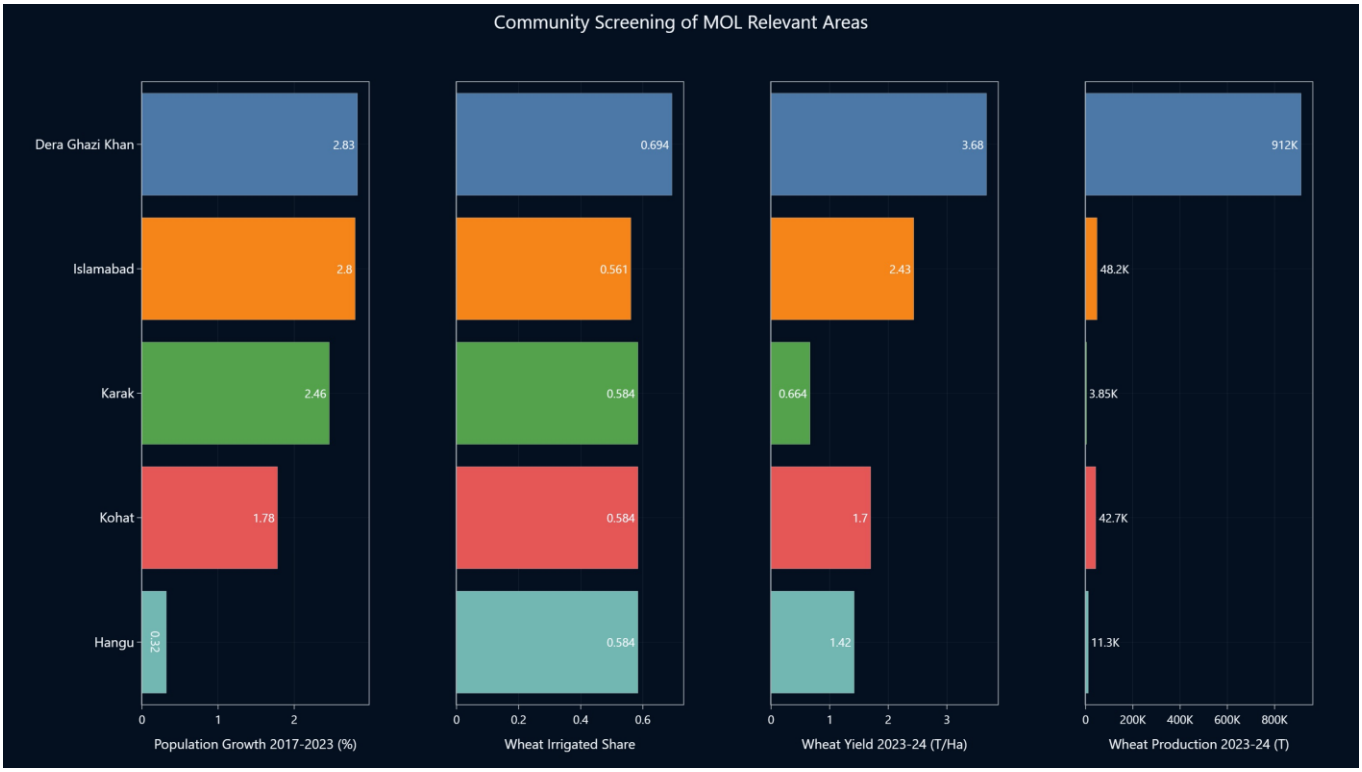


Figure 6-3. 2023-24 wheat production in MOL-relevant screening areas.

7. CSR / Social-Investment Portfolio

The current register captures 22 publicly documented projects or case studies from 2015–2024. The portfolio spans Water/WASH, Environment, Health, Education, Infrastructure, Livelihoods & Skills, Inclusion, Humanitarian support and Sports & Culture. Water/WASH is the most frequently documented theme in the present register.

7.1 What the Public Funding Data Do-and Do Not-Show

Seven projects in the current register have explicit public funding values, totalling approximately PKR 498.85 million. However, the Gurguri-Banda Daud Shah road project alone accounts for PKR 400 million of this amount and is a Tal JV financial-assistance figure rather than MOL-only expenditure. A further PKR 90 million is a cumulative water-scheme figure rather than one stand-alone project. The total is, therefore, a 'known disclosed funding captured' rather than annual MOL Pakistan CSR spend.

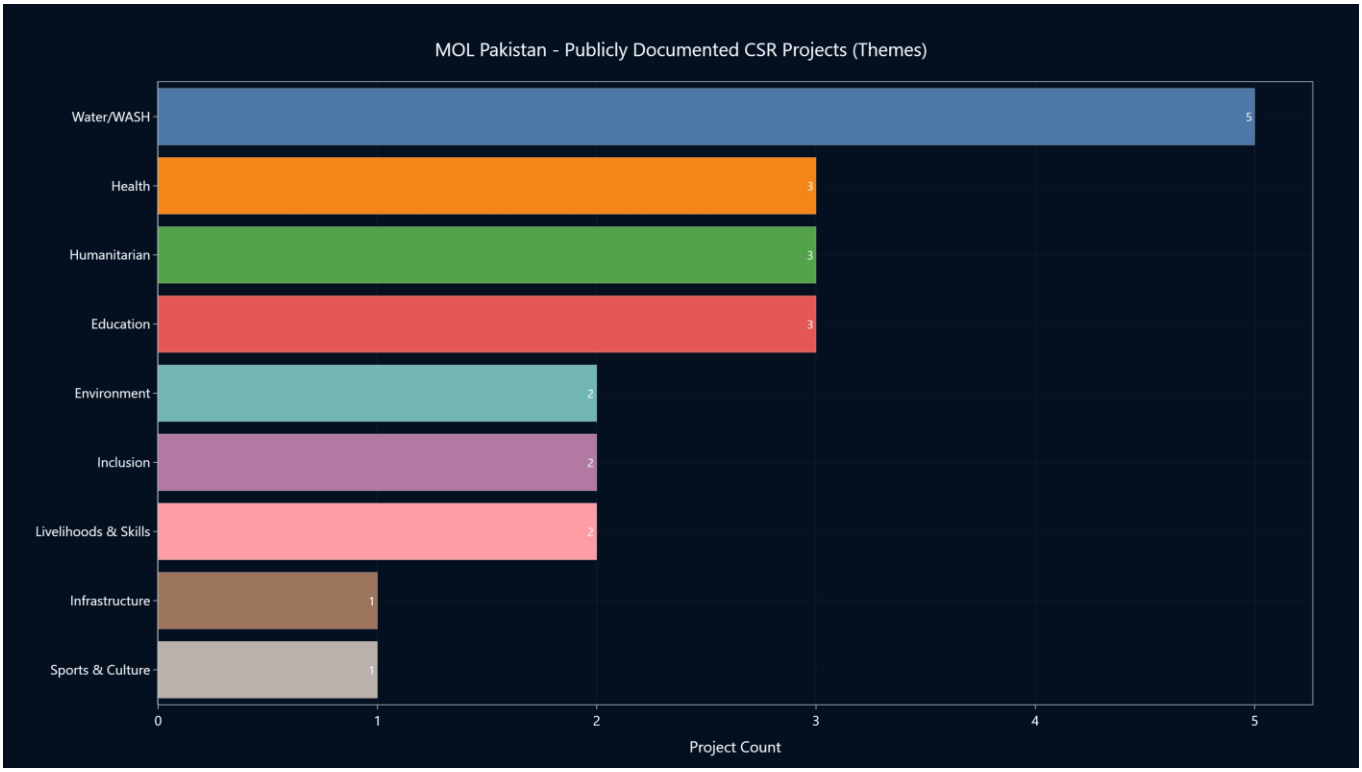


Figure 7-1. Publicly documented MOL Pakistan CSR projects by theme.

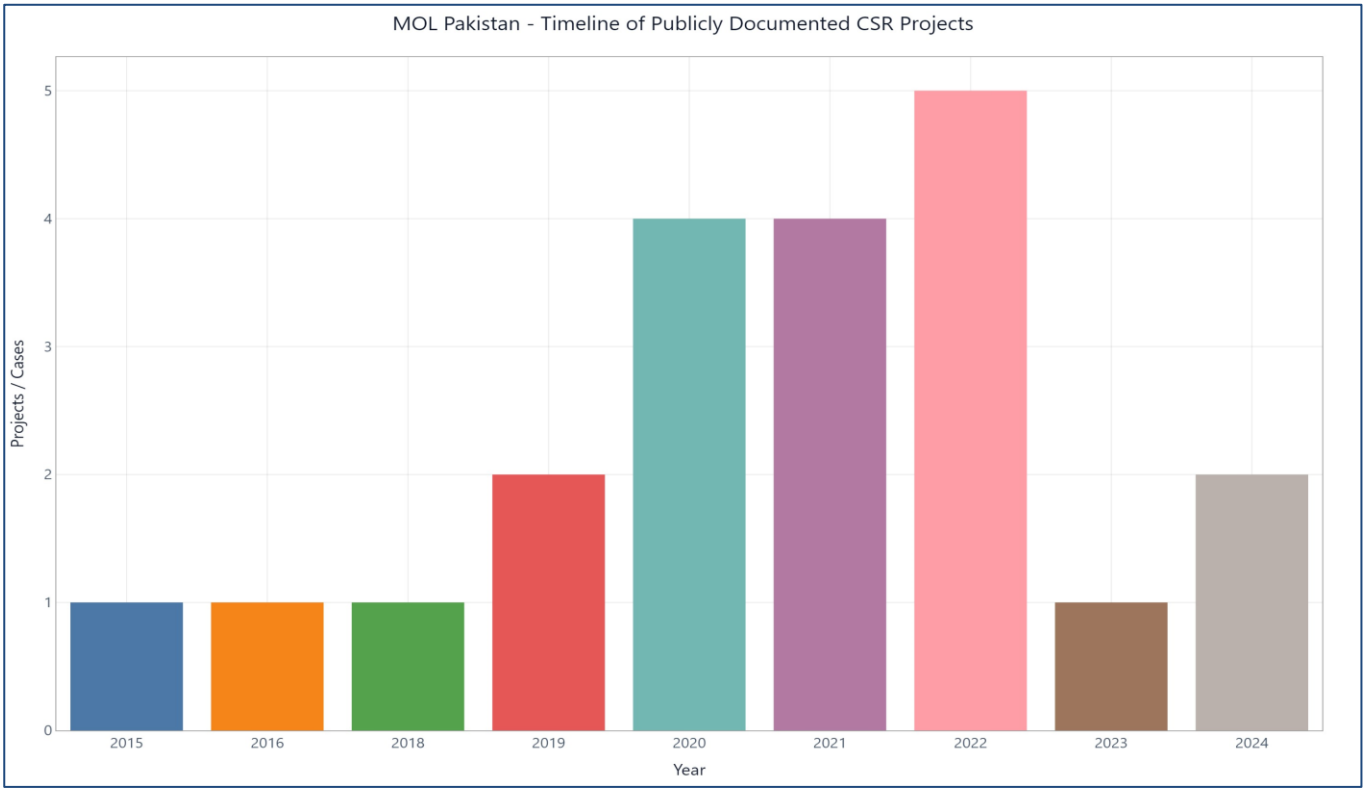


Figure 7-2. Timeline of publicly documented CSR projects in the public-source register.

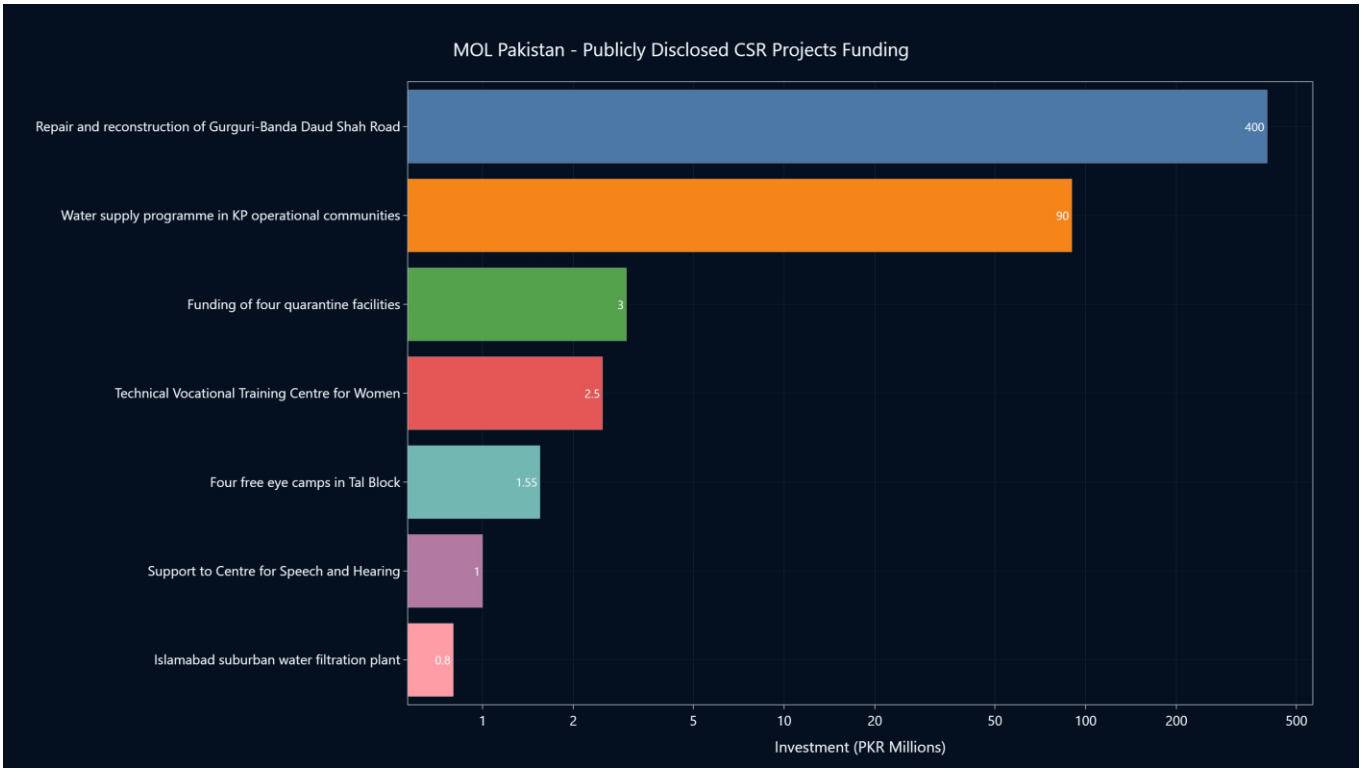


Figure 7-3. Publicly disclosed CSR funding captured in the project register.

7.2 Beneficiary Evidence

Quantified beneficiary evidence is even more concentrated. The current register contains 15,820 documented beneficiary instances where a numeric value is explicitly available. The Gurguri check-dam project accounts for 13,500 of these instances; the 2020 Tal Block eye camps account for about 2,000. This means the current beneficiary total is not suitable for claims such as 'total people reached by MOL CSR' because many projects lack counts and some individuals may benefit from more than one initiative.

7.3 Portfolio Interpretation

- The breadth of themes demonstrates sustained engagement, but breadth alone does not establish strategic effectiveness.
- Water-related projects are highly relevant because water scarcity is both a community vulnerability and an environmental operating issue identified by MOL Pakistan.
- Road, health, education and skills projects can create operational and social value, but define outcome indicators before project approval rather than reconstructed afterwards.
- JV-funded projects require transparent attribution: the public narrative needs to distinguish MOL-funded, JV-funded and employee-led initiatives.
- Tie future project selection to verified need, operating exposure, expected outcome, maintenance model and measurable post-handover performance.

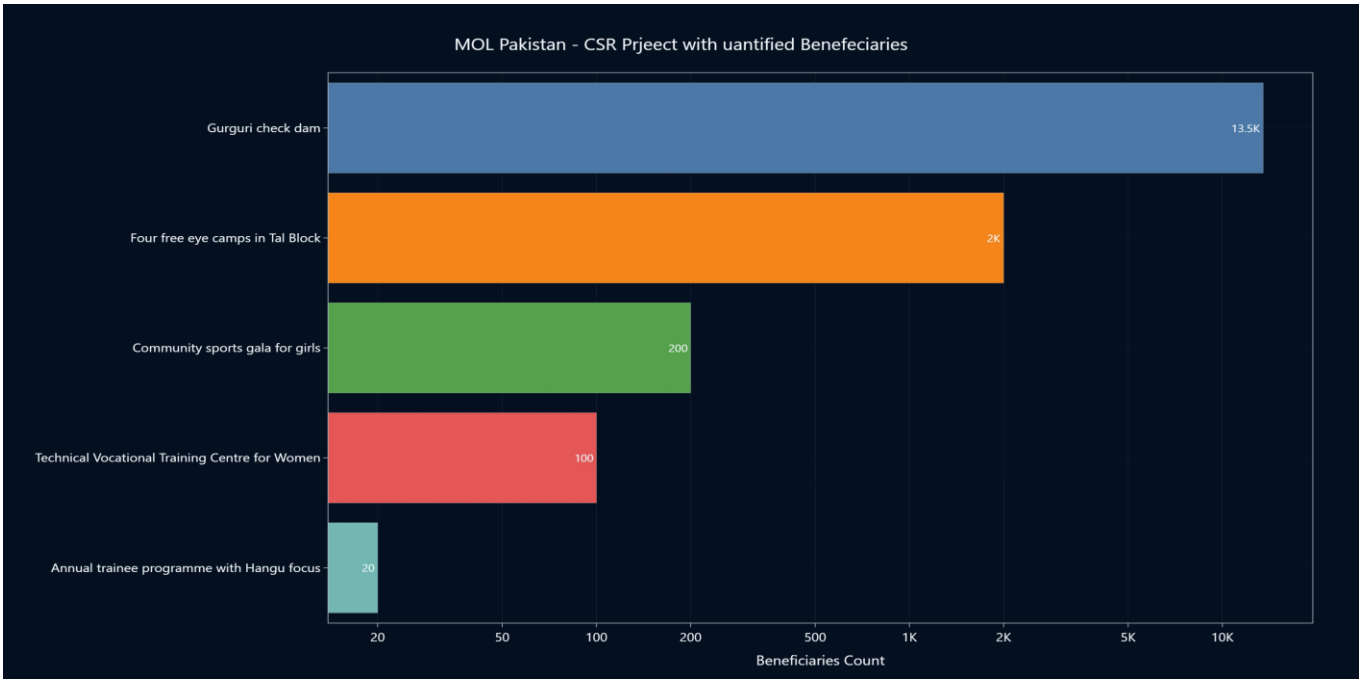


Figure 7-4. Projects with quantified beneficiary counts in the project register.

8. CSR Impact Measurement and Investment Prioritization

The impact framework proposed for the full programme is Inputs → Activities → Outputs → Outcomes → Long-term Impact. Each project needs a business-materiality statement explaining why the intervention is appropriate for the company and community.

Table 8-1. CSR impact chain for a water-project example.

Stage	Example: water project	Minimum evidence
Input	Capital, partner time, land/engineering support	Approved budget; funding source; JV attribution.
Activity	Construct filtration/water-supply/check-dam asset	Scope, contractor/partner, schedule.
Output	Scheme built; capacity; households connected	Commissioning and beneficiary register.
Outcome	Reliable water access; time saved; improved quality	Baseline/follow-up household and water-quality data.
Impact	Health, livelihood, resilience and trust effects	Longer-term survey/administrative evidence; cautious attribution.
Business linkage	Lower water conflict / stronger stakeholder relationship	Grievance, disruption and satisfaction trends.

8.1 Recommended Core Impact Kpis

Table 8-2. Recommended core CSR and social-investment impact KPIs.

KPI family	Examples	Decision use
Efficiency	Cost per beneficiary; cost per functioning asset; patients per PKR million	Compare delivery efficiency across similar interventions.
Inclusion	Female share; youth; disability inclusion; vulnerable groups	Test whether benefits reach intended populations.
Outcome	Functionality after 12/24/36 months; completion; employment conversion	Separate durable outcomes from one-time outputs.
Community	Satisfaction; grievance closure; repeat grievances; perception trend	Measure social licence and responsiveness.
Environment	Water conserved/recharged; survival of plantation; waste recovery	Connect CSR/environment actions to measurable ecological outcomes.
Business linkage	Operational disruption days; access incidents; stakeholder risk trend	Evaluate whether intervention supports resilience without claiming causality too strongly.

8.2 Community Need and Investment Priority Index

A future composite index may combine community need with business exposure, but weights should remain transparent and adjustable. A starting architecture could include socioeconomic deprivation, WASH vulnerability, education, health access, climate/environment exposure, livelihoods, proximity/business exposure, stakeholder sensitivity and implementation feasibility.

The current dataset is not yet complete enough to publish a final ranked index. The paper treats the index as a decision framework rather than producing a false level of precision.

9. Environment, Climate and Sustainability

MOL Pakistan's own environmental framing identifies waste management, emissions, water and biodiversity as material local topics. Water deserves particular attention because it appears simultaneously in operating environmental management, community vulnerability and the CSR portfolio.

This creates a distinctive analytical opportunity: compare operational water demand and efficiency with community water vulnerability and water-related social investment. That three-way relationship can identify areas where efficiency, community investment and stakeholder engagement benefit from integrated management.

9.1 Water

The present paper recommends an asset-level water balance including withdrawal by source, consumption, reuse/recycling, discharge, intensity per BOE and local water-stress context. Track community water projects separately but link them geographically so management can see whether operational exposure and social investment are aligned.

GIS context - Water stress and irrigated agriculture

Nationally, water stress intersects most strongly with Pakistan's irrigated agricultural corridor. The overlay below is especially useful for this synthesis because it connects environmental resource pressure with livelihood dependence. For MOL Pakistan, the implication is not that every operating area has the same stress profile; rather, water-related operational efficiency, community water investment and stakeholder engagement is interpreted against the broader basin-level pressure on water resources and agriculture.

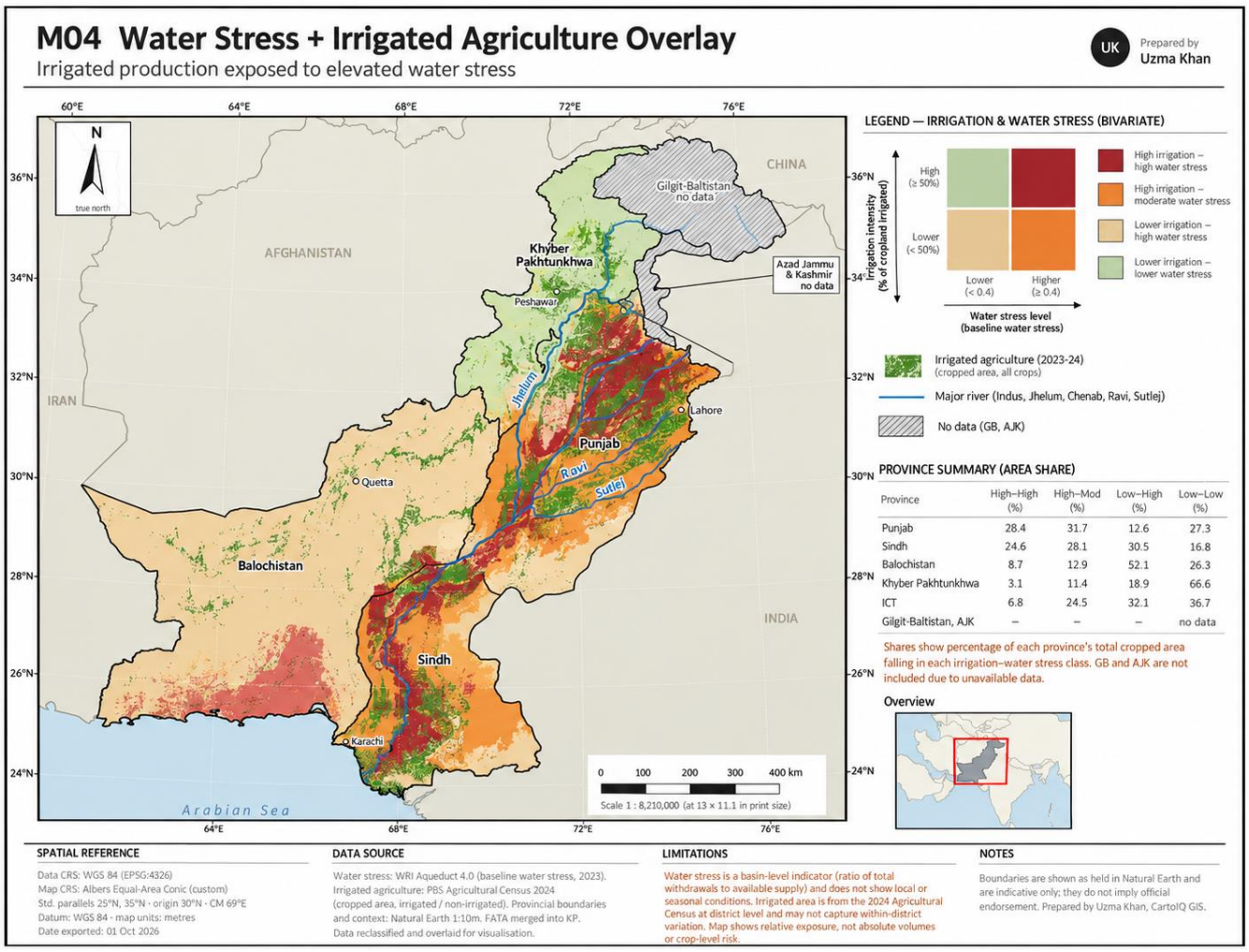


Figure 9-1. Water stress and irrigated-agriculture overlay for Pakistan.

9.2 Emissions, Methane and Flaring

The local public evidence reviewed so far does not provide a complete Pakistan numeric time series for Scope 1 emissions, methane or flaring. Treat these metrics as internal-data requirements rather than estimated from parent-company averages. Asset-level emissions intensity, flared/vented gas and include LDAR coverage in the local ESG data model.

9.3 Waste and Biodiversity

Track waste volumes, the hazardous/non-hazardous split and recovery rate quantitatively because MOL Pakistan publicly emphasizes waste reduction and recovery. Embed biodiversity screening in project gates, particularly for new investments, with land disturbed/restored and monitored biodiversity actions recorded.

GIS context - Rainfall variability and drought exposure

Climate variability adds another layer to water and community risk. The GAEZ/CHIRPS screening below distinguishes zones with relatively stable rainfall from areas characterized by moderate variability, chronic aridity or increasing drought risk. The map is most useful as a strategic screening layer for resilience planning, emergency preparedness and the design of water or livelihood interventions; it is not a field-scale forecast.

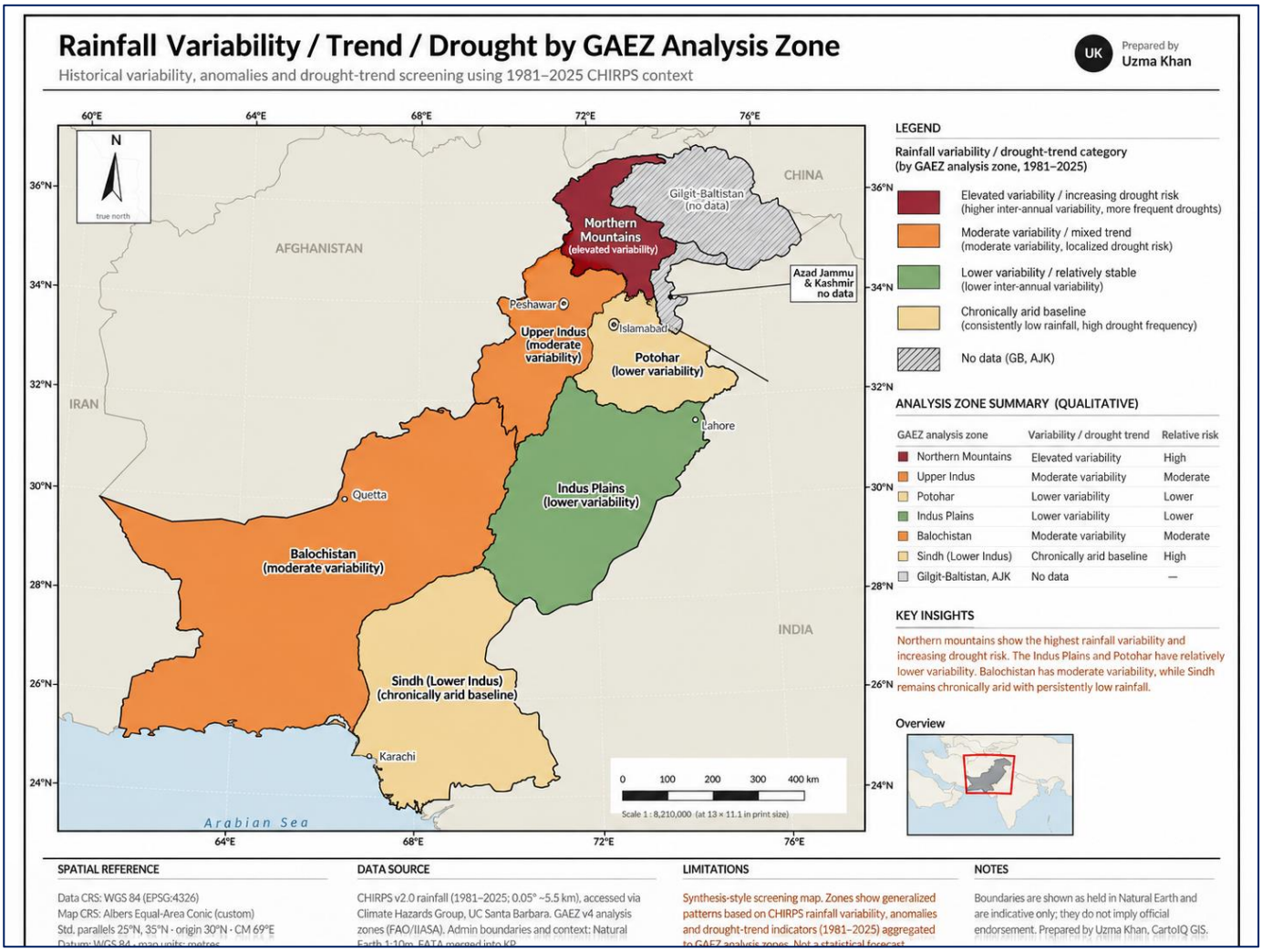


Figure 9-2. Rainfall variability, trend and drought screening by GAEZ analysis zone.

10. ESG Reporting Architecture and Data Controls

The current MOL-specific ESG framework contains 22 indicators across climate, environment, health and safety, human capital, communities and governance/reporting. The architecture is intentionally broader than a disclosure checklist because the same data supports operational decisions, risk management, management reporting and external sustainability reporting.

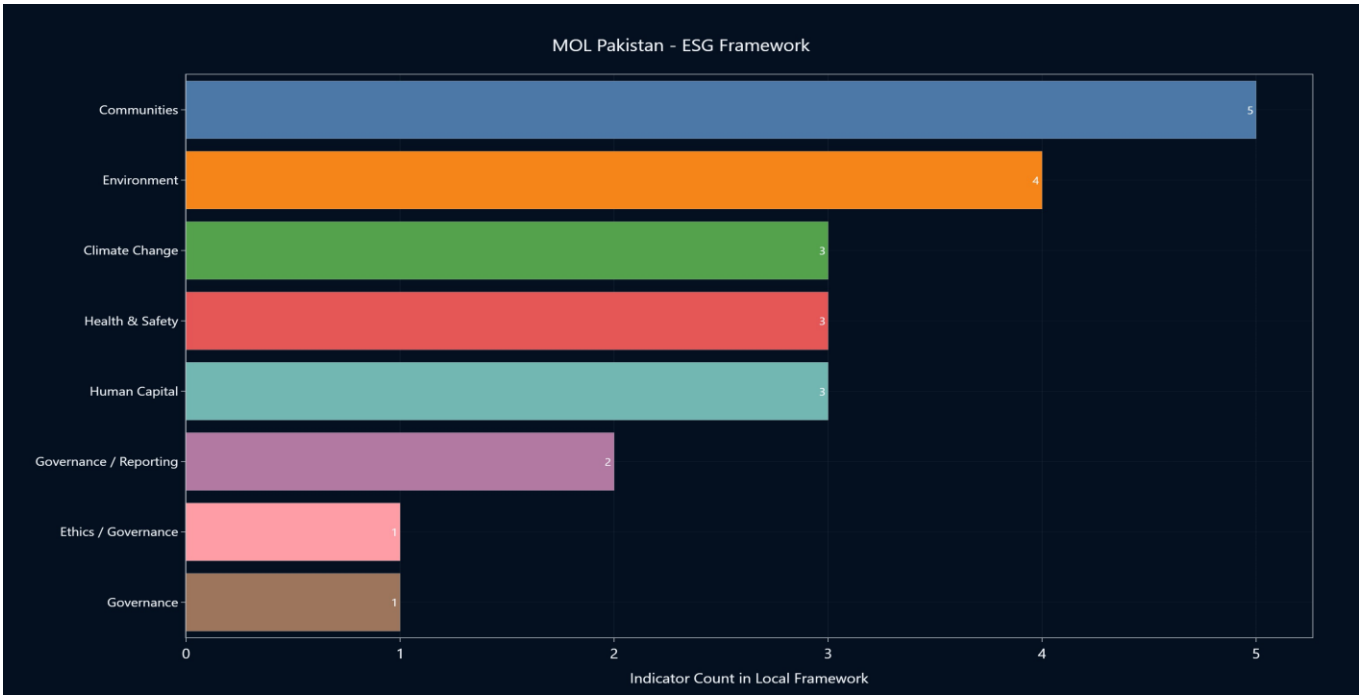


Figure 10-1. Indicator coverage across MOL Pakistan ESG framework.

The main limitation is numeric data availability at Pakistan level. Several indicators have qualitative local commitments or project examples, but not complete time series.

10.1 IFRS S1/S2 and SECP Relevance

SECP has notified phase-wise adoption of IFRS S1 and IFRS S2 in Pakistan. IFRS S1 focuses on sustainability-related risks and opportunities that could affect cash flows, access to finance or cost of capital; IFRS S2 focuses on climate-related risks and opportunities. The SECP's revised ESG Disclosure Guidelines for listed companies are aligned with the Pakistan Green Taxonomy.

MOL Pakistan's direct legal applicability requires confirmation rather than assumption from the listed-company guidance. Nevertheless, these frameworks are useful benchmarks because they reinforce four disciplines that are already strategically valuable: governance, strategy, risk management, and metrics/targets.

The recommended control model is:

> **KPI → definition → owner → source system → frequency → review control → evidence file → disclosure mapping →** assurance status.

11. Stakeholder Management, Grievance Intelligence and Social Licence

Stakeholder management has to be treated as an intelligence system rather than a contact list, linking each stakeholder to interests, influence, dependency, issue history, sentiment, engagement frequency, responsible owner and escalation triggers.

Table 11-1. Stakeholder groups, interests and suggested monitoring fields.

Stakeholder group	Primary interests / concerns	Suggested monitoring
Federal petroleum and economic authorities	Investment, production, policy, fiscal/market reforms	Policy changes, approvals, licensing and commercial issues.
Provincial / district administration	Local development, law/order, land, services	Engagement log, approvals, unresolved issues.
JV partners	Capital, technical decisions, governance, attribution	JV decisions, funding, project delivery and CSR attribution.
Operating communities / landowners	Access, jobs, water, roads, health, education, fairness	Grievances, satisfaction, local-hire/procurement, disruption signals.
Employees / contractors	Safety, development, inclusion, conditions	H&S, turnover, training, contractor performance.
Media / civil society / academia	Transparency, impact, environment and public-interest issues	Issue monitoring, evidence requests, narrative accuracy.

A grievance system becomes strategically useful when it can distinguish one-off complaints from repeated structural issues. Recommended KRIs include open grievances, average closure days, percentage closed within SLA, repeat grievances by issue/location, disputes causing operational delay and satisfaction after closure.

12. Strategic Communications and Impact Storytelling

Communication needs an evidence-led basis. This review recommends a claim-to-evidence register for major CSR and sustainability messages. Every public claim needs an identified underlying metric, source, date, geography, beneficiary definition, verification status and responsible owner.

This enables the same verified evidence to support multiple formats without changing the factual basis: an executive one-pager, newsletter story, social-media post, ESG disclosure, project proposal or stakeholder briefing.

Table 12-1. Strategic communication products, evidence requirements and cadence.

Communication product	Primary audience	Evidence requirement	Cadence
Executive risk brief	Country management / Group	Material changes, quantified exposure, decisions required	Monthly / event-driven
CSR impact dashboard	Management / JV / corporate affairs	Project cost, outputs, outcomes, beneficiary and sustainability data	Quarterly
Impact story	Community / public / media	Verified human story + metric + location + evidence	Milestone-driven
Newsletter	Employees / stakeholders	Portfolio milestones and verified achievements	Quarterly / semiannual
ESG disclosure pack	Group / regulator / assurance	Controlled KPI series and methodology	Annual / reporting cycle
Crisis / issue brief	Management / media / government	Facts, known unknowns, approved messages and actions	Event-driven

12.1 Twelve-Month Content Logic

The recommended calendar starts with operational and CSR milestones rather than publication dates. For each milestone, evidence capture, photography/testimonial consent, metric verification, internal approval, channel selection and post-publication engagement is best planned as one workflow. This reduces the risk of communications racing ahead of evidence.

12.2 From Analysis to Corporate Affairs Action

The practical test of this synthesis is whether analysis can be converted into timely corporate-affairs outputs. The role described at the outset of the project requires more than diagnosis: it requires risk communication, decision support, project design, impact assessment, consistent messaging and credible storytelling. The following translation layer shows how the analytical system can support those operational deliverables without duplicating MOL's existing internal processes.

Communication principle: MOL's corporate identity, approval processes and established communication standards remain authoritative. The contribution of this synthesis is the evidence chain behind the message: every material external claim needs traceability to a source, metric, geography, date, beneficiary definition and verification status. This protects both credibility and consistency while making successful CSR and operational outcomes easier to communicate with confidence.

Table 12-2. From analytical trigger to corporate-affairs action.

Analytical trigger	Evidence assembled	Corporate-affairs output	Decision / communication purpose
Political / regulatory change	Dated change, affected asset/process, likelihood, timing, economic/operational exposure	One-page risk alert; impact note; management brief; escalation entry	What changed, why it matters, who owns the response and when a decision is required.
Community / stakeholder signal	Grievance, access issue, sentiment change, local need, stakeholder influence	Stakeholder brief; engagement plan; issue log; talking points	Early warning before the issue becomes an operating disruption.
Potential CSR intervention	Need baseline, beneficiaries, geography, JV role, budget, sustainability and outcome logic	CSR project proposal; approval pack; partner brief	A defensible case linking community need, deliverability and measurable outcome.
CSR project milestone / completion	Cost, outputs, beneficiary evidence, functionality, outcome indicators, lessons	Impact assessment; management scorecard; post-handover review	Evidence for scale, redesign, continuation or closure.
ESG / sustainability issue	Metric trend, threshold, ownership, control status and reporting relevance	Dashboard exception; assurance request; management note	Connect operational performance with Group and external reporting requirements.
Verified positive outcome	Source-checked metric, geography, beneficiary definition, before/after evidence	Newsletter item; impact story; social content; executive brief	Communicate only claims that can be traced to evidence.
Sensitive / adverse event	Confirmed facts, uncertainty, affected stakeholders, operational implications	Holding statement; Q&A; stakeholder matrix; update cadence	Consistent tone and factual control while the situation evolves.
Monthly / quarterly management cycle	Top risks, CSR outcomes, stakeholder issues, ESG exceptions, decisions due	Executive dashboard; monthly brief; action tracker	Focus management attention on decisions rather than information volume.

13. Integrated Risk-to-Reward Decision Framework

The central strategic contribution of the synthesis is to complement MOL Group's mature ERM and sustainability systems with a Pakistan-focused analytical linkage among external risk, community need, social investment, ESG performance, asset exposure and business continuity. The objective is integration and visibility, not creation of a parallel risk-governance structure.

Table 13-1. Integrated risk-to-reward decision framework.

Risk / issue	Response options	Decision metric	Potential reward
Water scarcity / community competition	Efficiency, water baseline, recharge/WASH, transparent engagement	Operational water intensity; water-access gap; scheme functionality; grievances	Lower conflict exposure, resilience and community benefit.
Community dissatisfaction / access	Early engagement, grievance SLA, targeted local intervention	Repeat grievances; closure time; disruption days; satisfaction	Improved social licence and fewer avoidable delays.
Production decline / curtailment	Optimization, reserve replacement, development, commercial engagement	Decline rate; reserve replacement; uptime; curtailed volume	Production resilience and improved monetization.
Regulatory / ESG reporting change	Impact analysis, data controls, gap assessment, assurance readiness	Compliance milestones; KPI ownership; unresolved gaps	Faster adaptation and stronger stakeholder confidence.
Climate / flood / drought	Hazard mapping, resilient roads/water systems, emergency plans	Access outages; affected communities; response time	Business continuity and local resilience.
Weak CSR outcome evidence	Baseline/follow-up design, independent verification, standard KPIs	% projects with baseline and 12/24-month review	Better capital allocation and credible communication.

13.1 Decision Gates

- Gate 1 - Business materiality: what asset, project, permit, production stream or stakeholder relationship could be affected?
- Gate 2 - Risk / need diagnosis: what evidence supports the issue?
- Gate 3 - Stakeholder and geographic exposure: who is affected and where?
- Gate 4 - Intervention fit: operational, regulatory, engagement, CSR, communication-or a combination?
- Gate 5 - Deliverability and economics: cost, partner, maintenance and failure modes.
- Gate 6 - Outcome measurement: baseline, outputs, outcomes, sustainability and business linkage.
- Gate 7 - ESG/reporting alignment: owner, controls, standards and assurance.
- Gate 8 - Review: scale, hold, redesign, partner, communicate, defer or exit.

14. Executive Dashboards and Decision-Support Architecture

A Pakistan-specific analytical and visualization layer can demonstrate how risk, CSR, community and ESG evidence may be connected without replacing MOL's existing ERM, reporting, data-management or dashboard systems. The implementation should avoid a single overloaded dashboard and instead present four linked analytical views.

Table 14-1. Executive dashboard and decision-support architecture.

Dashboard	Primary content	Key management question
Risk Observatory	Political/regulatory/community risks, triggers, exposure, mitigation, owner	What changed, what is exposed, and what decision is needed?
CSR Impact Observatory	Project portfolio, cost, beneficiaries, outputs, outcome status, sustainability	Which interventions work and where is the next rupee best directed?
Community Intelligence	Need indicators, asset proximity, grievances, interventions, climate exposure	Where are need and business exposure jointly highest?
ESG Scorecard	Environment, H&S, human capital, communities, governance, reporting controls	Which sustainability indicators are improving, missing or outside tolerance?

A fifth executive layer can summarize only the indicators requiring management attention: red/amber risks, major project decisions, overdue grievances, CSR projects without outcome evidence, ESG data-control exceptions and upcoming regulatory deadlines.

15. 2026–2035 Strategic Roadmap

This roadmap presents a validation-and-enhancement sequence. The first action in each phase is to map the proposed analytical element to MOL Group and MOL Pakistan processes already in place, retain mature controls that are functioning effectively, and add only those Pakistan-specific data, linkages or transparency measures that create incremental value.

Table 15-1. Strategic roadmap, timing, actions and outputs.

Phase	Timing	Priority actions	Outputs
1. Establish control base	0–90 days	Finalize data dictionary; confirm asset/community geography; assign owners; create risk and grievance registers	Verified master dataset; ownership matrix; first dashboard.
2. Build measurement discipline	3–12 months	Baseline priority communities/projects; standardize CSR proposals; define ESG KPI controls; launch communication evidence register	Baseline pack; CSR scorecards; ESG gap assessment; content calendar.
3. Prove outcomes	12–24 months	Post-completion audits; community survey; water/H&S/environment time series; risk-response review	Impact evidence; project redesign/scale decisions; assured KPI subset.
4. Integrate strategy	2028–2030	Link CSR/ESG/risk to asset planning, capital allocation and JV governance	Risk-adjusted social-investment portfolio and strategic dashboards.
5. Institutionalize	2030–2035	Refresh community priorities, climate scenarios and strategic roadmap	Repeatable planning cycle; long-term resilience and impact evidence.

16. Strategic Validation, Learning and Enhancement Opportunities

MOL Group's public disclosures demonstrate a mature global risk-management, governance, sustainability and integrated-reporting architecture. The purpose of this section is not to prescribe basic controls to a sophisticated international operator. It is to use an independent Pakistan-focused review to validate how publicly evidenced global practices translate locally, identify areas where external evidence is incomplete, capture lessons from MOL Pakistan's long operating history, and suggest optional enhancements where they could improve integration, transparency or analytical visibility.

The starting position is appreciative rather than corrective. MOL Pakistan has maintained an operating presence since 1999, built a material JV-backed investment base, contributed to MOL Group production and reserves, and continued to operate in a highly complex environment. That record is consistent with strong organizational controls, partner management, stakeholder engagement and adaptive operating capability. Accordingly, the

opportunities below are intended to: preserve what already works; validate what cannot be seen externally; strengthen integration where evidence supports it; and avoid creating parallel processes where MOL already has mature systems.

A further strength highlighted by this review is security resilience. Public evidence shows that the Tal-area operating environment has included material security and access risk, including direct incidents affecting field operations, yet MOL has sustained a long-running Pakistan business and continued exploration, development and community programmes. Any further security recommendation focuses on preserving, validating and learning from the existing resilience model rather than implying that a basic security-management capability is absent.

1. Validate a Pakistan-specific political-regulatory-community view within MOL Group ERM

MOL Group already operates a comprehensive ERM system. Confirm how Pakistan-specific political, regulatory, community and social-licence risks are represented within that framework. Where useful, add a local analytical view with dated triggers, affected assets, financial/operational/community consequences, mitigation, opportunity and ownership, while retaining Group ERM governance and escalation.

2. Make the asset-value linkage explicit in the Pakistan analytical view

MOL's ERM is already value-creation and resilience focused. For this synthesis, make the Pakistan asset linkage visible by connecting high-reserve/high-production assets with the most material regulatory, community, infrastructure and environmental exposures. This is an analytical enhancement, not evidence that MOL currently fails to make such linkages internally.

3. Reinforce the integration of operational water risk and community water vulnerability

MOL Pakistan already identifies water scarcity as a material environmental issue and has a documented history of WASH and water-related community projects. Validate how operational water-efficiency indicators, local vulnerability, community investment and grievance signals are currently connected; strengthen the cross-functional view only where additional integration would improve decision quality.

4. Validate the consistency of CSR project baselines, outcome KPIs and lifecycle controls

MOL Pakistan publicly describes a structured social-investment approach. The external evidence base, however, does not allow this study to verify whether every project uses a common baseline, beneficiary definition, budget/JV attribution, outcome KPI, maintenance plan and 12/24/36-month review. Treat these fields as a validation checklist against existing internal practice, not as a claim that standardization is absent.

5. Confirm and, where useful, expand post-handover outcome verification

Public project announcements document many outputs but provide limited longitudinal evidence on functionality and outcome persistence. Confirm the post-completion monitoring already used by MOL/JV partners and, where coverage is uneven, extend functionality and use verification for material water, infrastructure, education, health and livelihood interventions.

6. Reconcile the research ledger with MOL's existing social-investment records

The incomplete public record is not an evidence that, by any means, MOL lacks a complete internal ledger. For analytical and reporting consistency, reconcile the research dataset with authoritative MOL/JV records where accessible, separating MOL-only, JV-funded and employee-led contributions, annual versus cumulative spending, and unique persons versus beneficiary instances.

7. Test the Community Need & Investment Priority Index as an optional decision-support tool

The proposed CNIPI is a research construct, not a correction to a known MOL deficiency. Complete the missing poverty/deprivation, health, education, livelihood and climate variables before using it, then test whether the index adds useful evidence to MOL's existing community-needs and social-investment prioritization processes.

8. Close the Dera Ghazi Khan gap in the external research dataset

The current gap is primarily in this study's public evidence. Confirm the actual block communities, current operator/partner responsibilities and available local baseline/CSR information before drawing conclusions

about community need or intervention coverage. Do not infer an operational or CSR deficiency from the present public-data gap.

9. Confirm Pakistan-level ESG data ownership and linkage to MOL Group reporting

MOL Group already maintains a substantial ESG data architecture and reporting system. Map the Pakistan-level definition, owner, source system, review control, reporting frequency and assurance status for priority indicators such as water, waste, emissions/methane/flaring, H&S, local employment, social investment and grievances, identifying only those gaps that remain after alignment with Group processes.

10. Validate traceability of Pakistan-specific impact communication

MOL Group has mature integrated reporting and publication controls. For Pakistan-specific CSR and impact stories, confirm that material claims can be traced to a dated source, metric, geography, beneficiary definition and verification status. Where this is already standard practice, document it as a strength; where public evidence is incomplete, improve traceability rather than presume weak controls.

11. Use Brill-Viz only as an optional analytical demonstration layer

Keep MOL's existing systems authoritative. Brill-Viz can demonstrate how separate public/research datasets might be linked through common geography, time, asset and stakeholder identifiers, but position it as a research and visualization prototype unless MOL itself determines that such functionality adds value to established internal platforms.

12. Align the synthesis review with MOL's existing annual planning and ERM cycles

MOL already reports regular risk oversight and established corporate planning/governance processes. Rather than create a parallel annual review, use the synthesis as an external or supplementary checkpoint for whether Pakistan-specific intervention priorities remain aligned with asset exposure, community need, regulatory change and measurable outcomes.

13. Use strategic economics as a public-data analytical lens, while recognizing MOL's internal investment discipline

MOL Group is a sophisticated international energy company and can reasonably be expected to apply established investment-economics and capital-allocation processes internally. The scenario economics in this study remains an external decision-support lens. Where internal project data are available, connect production, reserves, CAPEX, curtailment and regulatory exposure to MOL's existing economic evaluation framework rather than implying a need to create one from scratch.

17. Conclusions

This independent review has developed MOL Pakistan from a company-focused case into an integrated strategic synthesis while preserving a critical boundary: incomplete public evidence must not be confused with weak internal management. MOL Group publicly demonstrates mature governance, integrated sustainability reporting and comprehensive ERM, while MOL Pakistan's sustained presence since 1999, long-term JV-backed investment and continuing contribution to the international upstream portfolio indicate durable operating capability in a demanding country context.

The study's principal contribution is integration rather than criticism. It brings together E&P performance, global portfolio positioning, field depletion and remaining reserves, security and political-regulatory exposure, community conditions, CSR/ESG evidence, economics and strategic communication. The revised Chapter 4 strengthens that integration by comparing MOL Pakistan's production trajectory with domestic peers, distinguishing original reserves from cumulative production and remaining 2P, and linking physical decline and curtailment to transparent economic materiality screens without presenting those screens as company valuations.

The latest economic screening confirms that the physical scale is strategically meaningful, while distinguishing the endpoint gap from the rate of decline. FY2024-25 annual production is 9.7 MMBOE/year below the FY2019-20 annual rate; across five annual intervals, the simple average reduction in the annual production rate is about 1.94 MMBOE/year per year (approximately 9.3% compound annual decline). At US$70/90/110 per BOE gross-value-equivalent cases, the 9.7 MMBOE/year endpoint gap corresponds to approximately US$679 million, US$873 million and US$1.067 billion per year of annualized gross materiality. The linearized average annual erosion corresponds to roughly US$136 million, US$175 million and US$213 million of incremental annual gross-value capacity lost per year of elapsed time. A full-year 1-5 kboe/d deferred-production case spans approximately US$25.6-200.8 million across the same range, while the standardized 95.586 MMBOE remaining reserve base produces an undiscounted gross-value envelope of about US$6.691-10.514 billion. These values are deliberately not interpreted as MOL revenue, lost profit, NPV, IRR or asset value; their role is to show which operational, commercial and non-technical exposures are large enough to merit management attention and where official internal economics would be required for decisions.

Five outcomes remain central: Pakistan's position within MOL Group can now be quantified; production, reserve concentration and depletion maturity can be linked to business resilience; CSR activity can be separated from demonstrated long-term impact; community differences can be treated as decision variables; and MOL's mature global ERM/ESG architecture provides the correct institutional context for any recommendation. The next stage emphasizes validation, completeness and decision usefulness rather than expansion for its own sake. Where MOL already performs a function effectively, the synthesis can recognize and learn from that strength; where public evidence is incomplete, it can identify a transparency or research gap; and where an analytical enhancement is useful, it needs to fit MOL's existing governance, planning and communication architecture.

Security deserves explicit recognition within that balanced conclusion. External advisories and MOL's own reporting confirm that parts of the Pakistan operating environment carry material security and access risk, and that such exposure has on occasion affected personnel and production. The fact that MOL Pakistan has nevertheless maintained a substantial, long-duration upstream presence, continued investment and technical activity, and remained a contributor to MOL Group's international portfolio is a significant demonstration of commitment and institutional resilience. The appropriate analytical response is not to portray the operating area only through a risk lens, but to recognize successful continuity under pressure as one of the strengths from which the wider study can learn.

Appendix A: Current Data Gaps and Evidence Boundaries

Important interpretation rule: the gaps listed below are gaps in the evidence available to this independent review unless explicitly stated otherwise. They are not meant to show that MOL Pakistan lacks the corresponding internal data, controls, systems or management processes.

Table A-1. Current public-data gaps and evidence boundaries.

Data block	Current status	Remaining gap	Priority
MOL E&P reserves/production	Strong Yearbook/operator basis; company equity metrics partly available	Longer field-level production, reserve additions/replacement, curtailment volumes	High
Political/regulatory	Framework and monitoring task established	Historical event register with quantified asset impact	High
CSR projects	22 public projects captured	Complete annual ledger, unique beneficiaries, outcomes and post-handover audits	High
Community baseline	Population, literacy, WASH, wheat/agriculture for 5 areas	Poverty, health, education access, livelihoods, climate hazards, exact block villages	High
Environment	Public priority themes known	Pakistan water, waste, emissions, methane/flaring, biodiversity time series	High
H&S / Human capital	Framework defined	Pakistan numeric H&S, local-hire, gender and training series	Medium-High
ESG reporting	Standards crosswalk structured	Entity applicability, local data controls and assurance mapping	High
Communication	Architecture defined	Channel performance, audience segmentation and content-impact analytics	Medium

Appendix B: Glossary and Definitions

The following definitions are used in this synthesis to maintain consistency across energy, risk, community, CSR, ESG and analytical sections. Where an external standard has a formal definition, the glossary summarizes the concept for practical use in this study rather than reproducing the standard verbatim.

Table G-1. Core glossary and definitions.

Term	Definition / use in this synthesis
2P reserves	Best-estimate petroleum reserves, commonly understood as proved plus probable reserves. Reserve basis must always be stated because operator-attributed field reserves and company working-interest/equity reserves are not directly interchangeable.
BCF	Billion cubic feet of natural gas.
Beneficiary instance	A recorded participation or service event associated with a project. It is not automatically a unique person because the same individual may benefit from more than one activity or more than once.
BOE / MMBOE	Barrel of oil equivalent / million barrels of oil equivalent. Used to combine oil and gas on an energy-equivalent basis where appropriate; state the conversion basis.
CAPEX	Capital expenditure: spending to acquire, construct, develop or materially improve long-lived assets.
CHIRPS	Climate Hazards Center InfraRed Precipitation with Station data, a gridded rainfall dataset used in the wider Water-Food-Agriculture/GIS work. District-level values are used only when properly extracted and validated.
Community baseline	Pre-intervention description of socioeconomic, service-access, livelihood, environmental and stakeholder conditions against which later change can be assessed.
Community Need & Investment Priority Index (CNIPI)	A proposed composite screening framework combining community need, environmental/social vulnerability, operating exposure, stakeholder sensitivity and implementation feasibility. It is a prioritization aid, not a substitute for field validation.
CSR	Corporate Social Responsibility. In this synthesis, CSR is treated as a portfolio of social-investment and community programmes whose outputs, outcomes and sustainability requires measurement rather than inference from expenditure alone.
Data lineage	Traceable chain linking a reported value or claim to its source record, transformation, calculation, quality control and final analytical use.
Double materiality	A sustainability perspective that considers both how sustainability issues can affect an organization and how the organization can affect people and the environment. It is broader than the investor-focused financial materiality of IFRS S1/S2.
DSCR	Debt Service Coverage Ratio: cash available for debt service divided by scheduled principal and interest. Included where project-finance or strategic-investment bankability is assessed.
ESG	Environmental, Social and Governance factors used to assess sustainability-related performance, risks, opportunities, controls and disclosures.
Flaring	Controlled combustion of hydrocarbon gas, normally for operational, safety or process reasons. It can represent both emissions and loss of potentially marketable gas.
GHG / Scope 1 emissions	Greenhouse-gas emissions / direct emissions from sources owned or controlled by an organization. Scope classification follows the reporting framework used.
GIS	Geographic Information System: the data, methods and software used to join, analyze and visualize information by location.
GRI Standards	Global Reporting Initiative standards for reporting organizational impacts on the economy, environment and people.
Grievance mechanism	A documented process through which communities or other stakeholders can raise concerns, receive a response and track resolution. Useful indicators include number of grievances, recurrence, closure rate and closure time.
H&S / HSE	Health and Safety / Health, Safety and Environment. These terms cover workforce, contractor and operational risk controls relevant to upstream activities.
Impact	Longer-term change attributable wholly or partly to an intervention. In this study, impact claims require stronger evidence than activity or output reporting.

Impact chain	The sequence Inputs → Activities → Outputs → Outcomes → Long-term Impact used to design and evaluate CSR and community programmes.
IFRS S1	IFRS Sustainability Disclosure Standard setting general requirements for disclosure of sustainability-related risks and opportunities that could reasonably affect an entity's prospects.
IFRS S2	IFRS Sustainability Disclosure Standard focused on climate-related risks and opportunities, including governance, strategy, risk management, metrics and targets.
Ipieca	Global oil and gas industry association that publishes sustainability and environmental/social good-practice guidance, including sustainability reporting guidance developed with API and IOGP.
JV	Joint venture: an arrangement in which two or more parties share interests, obligations, risk and/or returns. CSR funding needs to distinguish MOL-only from JV-supported expenditure.
KPI	Key Performance Indicator: a quantitative or qualitative measure used to track performance against an objective.
KRI	Key Risk Indicator: a measure designed to signal increasing or changing exposure to a material risk before or as consequences emerge.
Materiality	The significance of an issue to decisions, performance, risk or stakeholders. Here, business materiality connects political, regulatory, community and ESG issues to affected assets, cash flows, operations and reputation.
Methane / fugitive emissions	Methane released intentionally or unintentionally from equipment, processes or leaks. Fugitive methane is a material upstream climate and operational-efficiency issue.
MOL equity / working-interest metric	A production, reserves or investment measure stated according to MOL's economic interest. It must be distinguished from gross or operator-attributed field measures.
Operator-attributed metric	A field or company measure aggregated under the operator in the Pakistan Energy Yearbook. It can include volumes attributable economically to JV partners and does not represent MOL's net entitlement.
Outcome	A change experienced by beneficiaries, communities, institutions or the environment after outputs are delivered; for example improved access, skills, health, productivity or resilience.
Output	The immediate deliverable of an activity, such as a road length repaired, filtration plant installed, trainees enrolled, consultations delivered or trees planted.
Pakistan Green Taxonomy (PGT)	Pakistan's classification framework for environmentally sustainable economic activities, relevant to the direction of ESG and sustainable-finance reporting in Pakistan.
Residual risk	Risk remaining after controls, mitigation or response actions are applied.
Reserve life / R/P ratio	Remaining reserves divided by annual production. It is a screening indicator of resource longevity, not a forecast of actual field life.
Reserve replacement	Addition of reserves through exploration, appraisal, development, revisions, acquisition or improved recovery sufficient to offset produced volumes.
Risk appetite	The amount and type of risk an organization is willing to accept in pursuit of objectives. Public data rarely reveal a company's full internal risk appetite.
SDGs	United Nations Sustainable Development Goals: 17 global goals covering social, economic and environmental development priorities.
SECP	Securities and Exchange Commission of Pakistan, the corporate and capital-markets regulator responsible for sustainability-related disclosure initiatives relevant to Pakistan's reporting environment.
Social investment	Planned expenditure or in-kind support intended to create social, community or environmental benefit. Benefits and attribution require evidence.
Social licence to operate	The continuing level of acceptance and trust granted by communities and stakeholders beyond formal legal permission. It is dynamic and cannot be reduced to a single approval or CSR payment.
SROI	Social Return on Investment: an approach that compares social value created with resources invested. Use monetary SROI only where assumptions and valuation methods are transparent and defensible.
Stakeholder	An individual, group, institution or organization that can affect, is affected by, or has a legitimate interest in an activity, decision or outcome.
Strategic communication	Evidence-based communication designed to support understanding, alignment, trust and decision-making among defined audiences. Public claims need traceability to verified evidence.
WASH	Water, Sanitation and Hygiene. WASH indicators are used as part of community-vulnerability and social-investment assessment.
Water intensity	Operational water withdrawal or consumption normalized by an appropriate activity measure such as production. The denominator and water boundary must be explicitly defined.
Working interest (WI)	The economic interest held by a company in a petroleum licence, field or venture. State the reporting basis.

Economic and valuation terms

Table G-2. Economic and valuation terms used in this synthesis.

Term	Definition used in this synthesis
CAPEX	Capital expenditure: spending to acquire, develop or materially enhance long-lived assets.
OPEX	Operating expenditure: recurring cost required to operate and maintain producing assets.
Netback	Revenue per unit after specified downstream/transport/royalty or operating deductions; the exact definition must be stated.
NPV	Net Present Value: discounted value of future net cash flows at a stated discount rate.
IRR	Internal Rate of Return: discount rate at which project NPV equals zero.
Breakeven price	Product price at which a defined project economic criterion-commonly NPV=0-is achieved.
Sensitivity analysis	Systematic change of one or more assumptions to test how strongly an output responds.
Scenario analysis	Evaluation of coherent sets of assumptions-such as downside/base/upside-rather than a single-variable change.
Gross value exposure	Illustrative economic magnitude before working interest, fiscal terms, operating cost, timing and other deductions; not reported revenue or profit.
Deferred production	Production capacity not realized in the current period but potentially recoverable later; economically different from permanently lost reserves.
SROI	Social Return on Investment: framework that compares monetized social value with investment cost where credible valuation is possible.

Data Availability and Reproducibility

This synthesis integrates publicly available national and international energy, reserves and production, demographic, community, CSR/ESG, regulatory, agricultural and GIS evidence relevant to MOL Pakistan and selected comparators. It does not rely on privileged access to MOL Pakistan or MOL Group internal systems, confidential decision files, field economics or Board materials. Source-level records are retained separately from harmonized analytical extracts wherever practicable, with reporting basis and limitations preserved where available.

The global MOL E&P comparison uses a ten-country analytical layer with ISO3 identifiers, operating status, FY2024 production and published country-level 2P reserve values where available. Pakistan-specific upstream analysis uses the Pakistan Energy Yearbook together with MOL/MOL Group disclosures. Mixed-year observations are retained with their actual reporting year and are not represented as a single common-year dataset.

The energy and upstream evidence includes the Pakistan Energy Yearbook 2024-25 and MOL/MOL Group published information. Community screening uses Pakistan Census 2023 population, literacy and WASH evidence together with selected Agricultural Census 2024 indicators already validated in the Water-Food-Agriculture/GIS work. CSR and ESG modules combine company disclosures with derived analytical classifications, while the GIS figures distinguish national or district screening context from asset-level evidence.

The supporting analytical package comprises the MOL Corporate Strategy master workbook, the eleven-company reserves/production and strategic-opportunities workbook, the MOL CSR/community/ESG modules, the pre-existing Water-Food-Agriculture/GIS source workbooks used for selected community variables, and documented source/evidence registers. These files preserve source-level observations, derived indicators and analytical assumptions separately wherever practicable so that evidence provenance and interpretation boundaries remain auditable.

The strategic-economics figures are derived screening calculations rather than reported MOL Pakistan financial results. Their auditability depends on retaining the stated physical inputs, conversion conventions and scenario assumptions. Any subsequent NPV/IRR analysis needs a dedicated economics model preserving production forecasts, product-specific prices and realizations, working interest, CAPEX, OPEX, fiscal terms, discount rate, timing, financing and scenario metadata.

The GIS and community evidence distinguishes verified district-level attributes from approximate, proxy or still-pending spatial variables. District baselines do not represent exact village- or asset-level conditions. Variables requiring raster extraction, field surveys, internal MOL operational data or more precise block-community geometry remain explicitly identified as gaps rather than estimated silently.

Original third-party datasets and published materials remain subject to their source-specific terms, permissions and licences; this study does not claim ownership of those materials. Repository accession numbers, DOIs and archived identifiers can be added at the time of formal deposit or publication.

Declarations

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Conflict of interest: The author founded EnerBrill and develops Brill-Viz, a platform used in this research. Brill-Viz and related software may have commercial value; this is disclosed as a potential commercial interest. Reconfirm any additional relevant financial, professional or organizational relationships at submission.

Author contributions: Khan Arshad conceived and designed the MOL Pakistan synthesis; defined the research questions and integrated energy, corporate-strategy, political-regulatory, community, CSR, ESG and communication frameworks; selected and critically reviewed the principal datasets and published evidence; developed the analytical architecture, dashboards, risk and impact frameworks; interpreted the quantitative results; and prepared the manuscript.

About the Author



Khan Arshad is a petroleum geologist, exploration professional, independent researcher and developer of scientific data-analytics and visualization tools, with nearly three decades of professional experience in oil and gas exploration, regional geological studies, petroleum-system analysis, prospect evaluation, petroleum economics and exploration-project management. He holds an M.Sc. in Petroleum Geology from the University of Aberdeen, United Kingdom, and an M.Sc. in Geology from the University of Karachi, Pakistan.

His professional career has included technical and managerial assignments in Pakistan with Baker Hughes INTEQ, OMV, PETRONAS, MND, Eni and Dewan Petroleum. His experience encompasses wellsite and operations geology, seismic and petrophysical interpretation, sequence stratigraphy, regional basin analysis, new ventures, prospect generation, exploration-risk and reserves assessment, exploration-team leadership and major exploration-project management.

A substantial part of his career has involved multidisciplinary integration of geological, geophysical, petrophysical, geochemical and economic evidence. His regional work has covered major sedimentary basins and tectonic provinces of Pakistan, including the Middle and Lower Indus basins, Kirthar and Sulaiman fold belts, Potwar Basin and Punjab Platform. This background has contributed to a broader interest in how complex natural-resource systems can be evaluated through integrated data, quantitative analysis and transparent visualization.

He is currently the founder of **enerbrill**, where he combines geoscience, energy-sector experience, data analytics, scientific visualization and software development. He has independently developed Brill-Viz, an integrated analytical and visualization platform, together with specialized applications for probabilistic volumetrics, geological chance-of-success assessment, petrophysical evaluation, Total Organic Carbon estimation, decision analysis, mind mapping, research synthesis and AI-assisted document intelligence.

His recent research has broadened from petroleum and energy systems into interconnected questions of water security, agricultural productivity, food security, climate, demography, trade, energy dependence, infrastructure, economic resilience and sustainable resource management. His particular interest lies in combining heterogeneous datasets from multiple disciplines into transparent analytical frameworks that distinguish observed evidence, derived indicators, uncertainty and interpretation.

For the present MOL Pakistan synthesis, the author is solely responsible for the research conception, evidence integration, analytical design and interpretation across the company's upstream context, Pakistan energy outlook, political and regulatory risk, community vulnerability, CSR/social investment, ESG performance, stakeholder intelligence and strategic communication. The study draws on his petroleum-sector background while extending the analysis into measurable community impact, sustainability reporting and risk-to-resilience decision support.

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