

Mature Oilfields – Nurture and Revitalize

Introduction

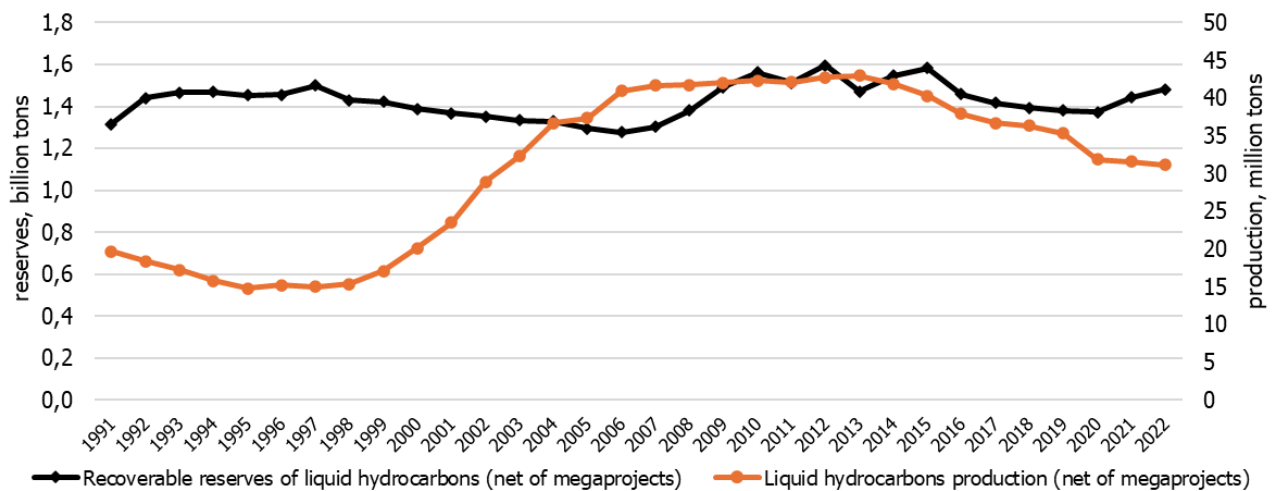
Kazakhstan's oil industry is at a critical crossroads, with its mature oilfields playing a pivotal role in the country's energy security and economic stability. These oilfields, the backbone of Kazakhstan's oil production for decades, now face declining output, raising concerns about the sustainability of the country's energy supply and the broader economic implications. Mature oilfields contribute almost 100% [based on data from January to October 2024] of the crude oil processed in Kazakhstan's refineries, making them indispensable for domestic energy needs. However, the warning signs of decreasing production from these oilfields [expected to drop from 30 million tons in 2024 to 24 million tons by 2030 and only 17 million tons in 2035, which is less than the current refinery capacity] pose risks to the country's energy security, as well as to its economic resilience, which heavily relies on oil revenues. The Government of Kazakhstan holds equity stakes in the largest operators of mature oilfields, underscoring the need for strategic interventions to ensure their continued viability. Without immediate action, Kazakhstan risks facing a crude oil shortage for its processing plants soon, which could have cascading effects on energy independence and economic stability.

Kazakhstan's mature oilfields

Mature oilfields (aka "brownfields") are typically defined as those that have passed their production peak and are now in the decline phase of their lifecycle. In Kazakhstan, most of the largest mature oilfields are located in three regions: Mangystau, Aktobe, and Kyzylorda. Some of the largest and most well-known mature oilfields are Uzen, Zhetybai, Kalamkas, Karazhanbas, Zhanazhol, and Kumkol. These and most of the other largest mature oilfields are operated by Ozenmunaigas [OMG], Embamunaigas, Mangistaumunaigas [MMG], Karazhanbasmunai, CNPC-Aktobemunaigas [CNPC-AMG], and PetroKazakhstan Kumkol Resources. Most of the country's mature oilfields are ultimately controlled by the Government via its ownership stake in KazMunaiGas. For this article, we approximate liquid hydrocarbons' [crude oil and condensate] reserves and production volumes of Kazakhstan's mature oilfields as total volumes net of megaprojects [Tengiz, Kashagan, and Karachaganak].

The chart below shows the dynamics of the balance of recoverable reserves [categories A+B+C1+C2 according to Kazakhstan's classification] and the production volumes of liquid

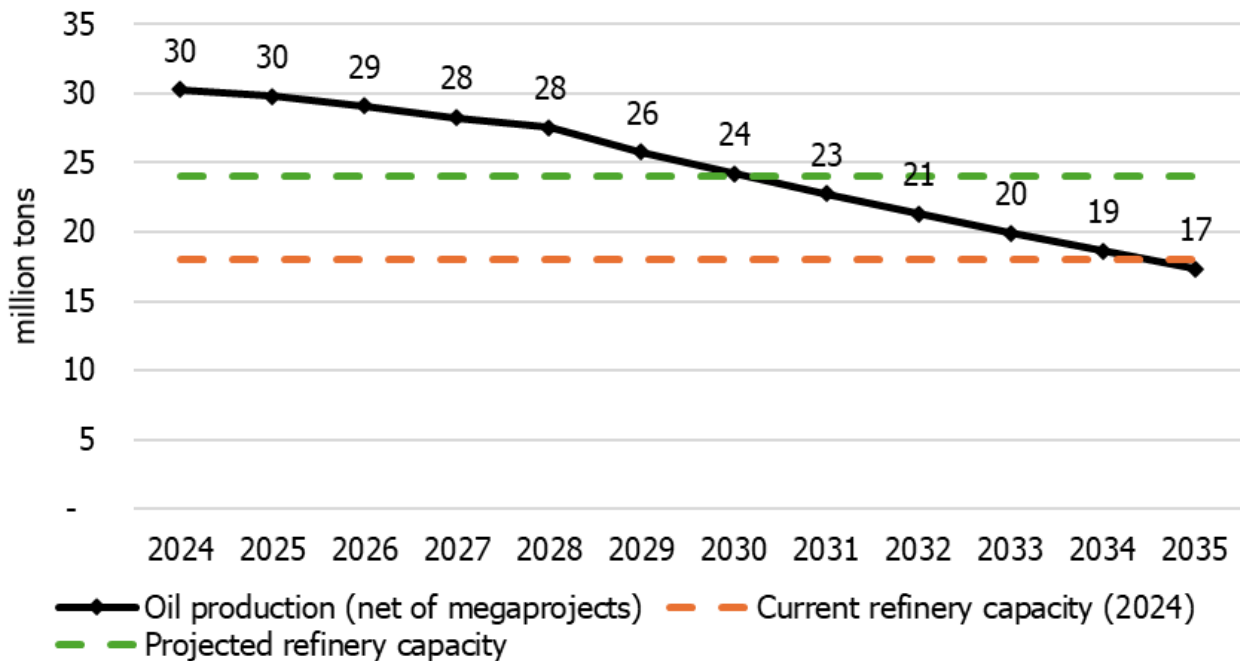
hydrocarbons since Kazakhstan declared its independence. During the period under review, reserves have remained within a relatively narrow range of 1.3–1.6 billion tons, while production increased from a low of 15 million tons in 1995 to a peak of 43 million tons in 2013. However, since 2014, a steady decline in production has been observed. In 2023, production amounted to 30 million tons, 30% lower than in 2013. The lack of significant growth in reserves and the decline in production may signal a decrease in profitability and, consequently, a lack of investment.



Source: compiled by ENERGY Insights & Analytics

According to the below forecast by ENERGY Insights & Analytics, oil production¹ from mature oilfields in Kazakhstan is projected to decline from the 30 million tons in 2024 (34% of Kazakhstan’s total oil production) to 24 million tons by 2030 (26% of Kazakhstan’s total oil production), a critical threshold as it matches the expanded capacity of the country’s refineries (18 million tons currently, increasing to 24 million tons with the expected Shymkent refinery expansion). This is a warning trend because, without intervention, production could continue to decrease by 6-7% annually, necessitating reliance on oil from megaprojects at global market prices to meet domestic demand.

¹ hereafter oil / crude oil means liquid hydrocarbons [crude oil and condensate]



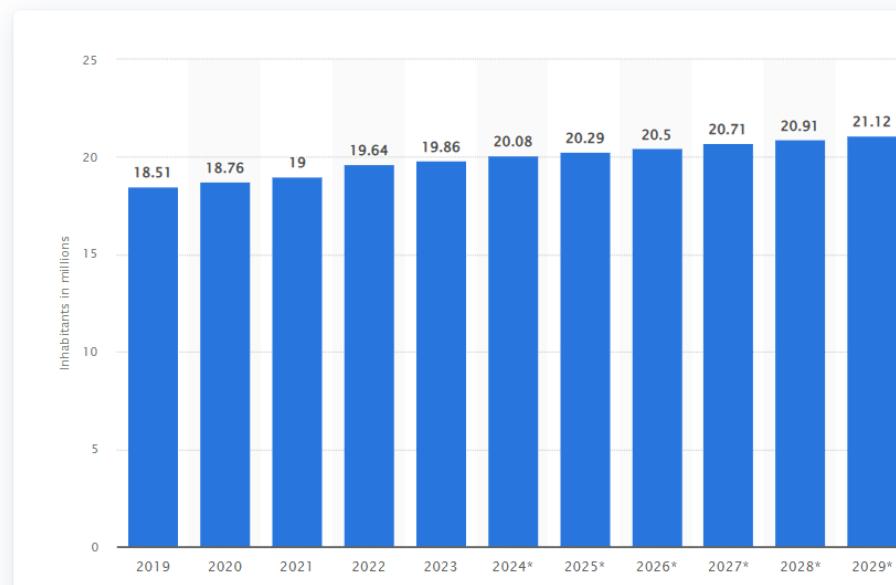
Source: compiled by ENERGY Insights & Analytics

Mature oilfields have been in operation for decades and employ a significant number of workers, both directly and indirectly, through oilfield service companies and other subcontractors. These oilfields' economic and social impact extends beyond oil production, as they provide livelihoods for thousands of people and support local economies. The most prominent example of such significant social dependence on a sole oil-producing company is OMG, a city-forming enterprise of Zhanaozen. The company's oil production has stagnated over the last decade and dipped below 5 million tons in 2023 for the first time in several decades despite historically aggressive drilling. The company employs [over nine thousand people](#), and several other large companies extensively depend on OMG's financial stability. For example, Burgylau, OMG's long-standing drilling provider, employs more than two thousand people.

Moreover, mature oilfields account for a significant share of the crude oil supplied to domestic refineries. Their decline could lead to a shortage of feedstock for processing plants, potentially jeopardizing the country's energy security. In our article ["Route to Sell – Markets and Netbacks"](#), we emphasized that the lion's portion of oil produced by companies like MMG, OMG, CNPC-AMG is sold to oil refineries, ultimately aiming to supply the domestic market with fuel.

Kazakhstan: Total population from 2019 to 2029

(in million inhabitants)



Source: Statista

The demand for various fuel types produced by Kazakhstan's oil refineries is poised to expand as the country's population [grows](#). Moreover, the Government has a very ambitious goal [to double the country's GDP by 2029](#). With such an ambitious macroeconomic goal, domestic oil consumption will inevitably grow. At the same time, we see that the oil production of major operators of mature oilfields is stagnating. This situation highlights the urgent need for reforms and investment in these oilfields to extend their productive life and ensure a stable supply of crude oil for domestic consumption.

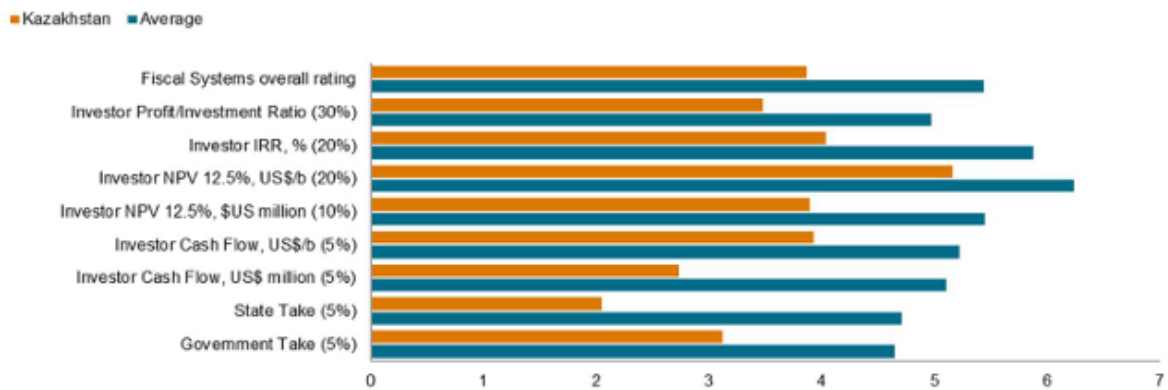
Why are major production expansion investments in mature oilfields seem unattractive?

Despite their importance, mature oilfields in Kazakhstan are currently not attractive to investors. One of the primary reasons for this is their shorter remaining lifecycle, which makes them less appealing compared to greenfields with higher production potential. Additionally, the high costs of maintaining and enhancing production from mature oilfields deter investment. However, these oilfields also offer certain advantages, such as their proven reserves and predictable production profiles, which reduce the risks associated with exploration and development.

The latest [Kazakhstan Energy Outlook 2024](#) provides highly valuable insights on the topic, shared by the esteemed analysts of S&P Global Commodity Insights [SPGCI]. The lack of

adequate tax incentives is a significant barrier to investment in Kazakhstan's mature oilfields. According to SPGCI's analysts, the country's fiscal regime imposes a heavy tax burden on oil producers, significantly reducing their profitability and discouraging investment in mature oilfields. For instance, the Mineral Extraction Tax [MET], export duties, and other levies account for a substantial portion of production costs, making it difficult for operators to justify further investments in these oilfields. Addressing these fiscal challenges is essential to unlocking the investment potential of Kazakhstan's mature oilfields.

Figure 4. Kazakhstan's performance in primary categories of Fiscal Systems component of the E&P Attractiveness Ratings during 4Q-2024 in comparison with average (for all countries evaluated)



Data compiled October 2024.

Source: S&P Global Commodity Insights

Despite making progress in SPGCI rankings over the last decade, updated quarterly, there is still significant room for improvement. As of Q4 2024, Kazakhstan's overall score was 5.49 out of 10. While this represents a decent performance compared to its historical results and several other large oil-producing countries, it still falls significantly short of the ranking's leaders, such as Norway and the U.K.

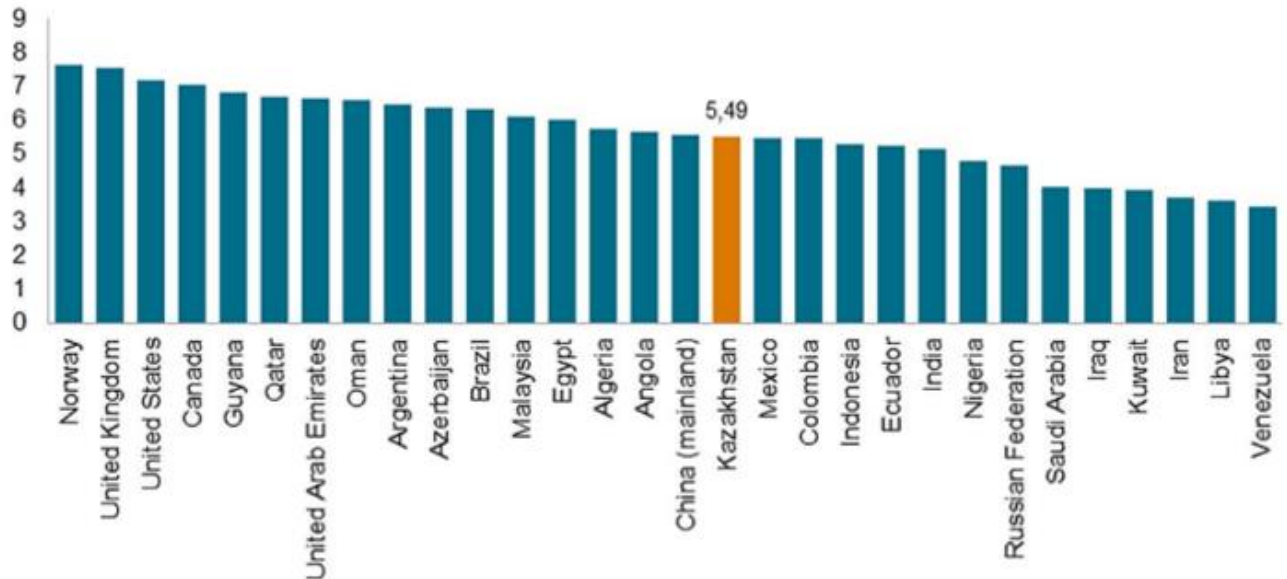
Table 1. Evolution of Kazakhstan's E&P Attractiveness Ratings score and rank, 2014-24

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Overall attractiveness rating	4.94	4.86	4.84	5.08	4.82	4.78	4.51	5.52	5.37	5.51	5.49
Kazakhstan's rank among all oil-producing countries selected for comparison	89	88	90	84	81	82	88	72	79	73	73

Ratings and rankings for the fourth quarter of each year.

Source: S&P Global Commodity Insights

Figure 2. S&P Global's E&P Attractiveness Ratings for selected hydrocarbon-producing countries in Q4-2024



Data compiled October 2024.
 Ranking as of fourth quarter 2024 for 30 largest crude oil producers in 2023.

Source: S&P Global Commodity Insights

Tax and regulatory incentives could play a transformative role in improving the investment climate for mature oilfields, while technological advancements offer opportunities to enhance productivity and reduce costs. Together, these measures could help revitalize Kazakhstan's mature oilfields and ensure their continued contribution to the country's energy security and economic stability.

Potential tax and regulatory incentives

There is significant room for improvement in Kazakhstan's fiscal system, as the country received an S&P Global Commodity Insights Fiscal Systems rating of 3.87, 29% below the average. According to the report, tax reforms aimed at alleviating the fiscal burden on investors "should be a top priority for policymakers." Updates to the country's Tax Code, which we discussed in [one of our previous publications](#), are highly likely to enhance the attractiveness of mature oilfields for investors—provided they are implemented in a timely manner with proper incentives.

According to the aforementioned ["Route to Sell – Markets and Netbacks"](#) article, the netback from export sales is significantly higher than domestic sales. This disparity poses a fundamental challenge, as the substantially higher export netback creates an imbalance that

undermines the domestic oil supply. Bridging the gap between export and domestic netbacks is essential for evaluating the effectiveness of potential tax and regulatory incentives.

Another issue is the uncertainty in crude oil sales obligations to the internal market, which often undermines the profitability of operations. Oil producers in Kazakhstan frequently face unpredictable mandates to supply crude oil to the domestic market at prices that are not only significantly lower than export prices but often below breakeven levels. This makes it nearly impossible for operators of mature oilfields, already struggling with thin margins due to high operational costs and declining output, to maintain financial sustainability. For operators, the lack of clarity about future domestic supply requirements and the financial losses associated with these obligations significantly diminish the attractiveness of investing in mature oilfields. This issue is particularly critical given the substantial capital expenditures required to implement new technologies and enhance recovery methods. This unsustainable dynamic highlights the urgent need for policy reforms. Key measures include the establishment of clear, predictable guidelines for domestic supply obligations and policies that prevent mandated supply volumes from falling below breakeven levels. Bridging the gap between domestic and export netback prices is also crucial to incentivize investment.

Tax incentives could play a transformative role in revitalizing Kazakhstan's mature oilfields. Potential measures include revising the country's Tax Code to introduce more favorable terms for mature oilfields, such as reduced MET rates or exemptions for certain types of investments. Another option is to implement an alternative mineral extraction taxation system that aligns with the economic realities of mature oilfields. For example, a sliding-scale tax regime that adjusts based on production levels and oil prices could provide much-needed relief to operators while ensuring a steady revenue stream for the Government.

Additionally, introducing stability clauses in contracts could enhance investor confidence by guaranteeing that fiscal terms will remain unchanged over the life of a project. These measures would make mature oilfields more attractive to investors and help sustain production levels, thereby contributing to Kazakhstan's energy security and economic stability. The success of similar initiatives in other oil-producing countries, such as Azerbaijan's extension of production-sharing agreements for its major oilfields, demonstrates the potential benefits of adopting a more investor-friendly fiscal regime.

Furthermore, the Government could consider reintroducing elements of production-sharing agreements [PSAs] for mature oilfields. PSAs have historically been effective in attracting investment by offering long-term stability and cost-recovery mechanisms. However, PSAs are no longer used in Kazakhstan, as they were excluded from the country's legislation. Instead, the Government has introduced Improved Model Contracts [IMCs] designed specifically for complex oilfields. While IMCs offer specific incentives, they do not provide complete stability across all fiscal and regulatory terms, which limits their overall attractiveness to investors. For a detailed analysis of the current state of IMCs and their potential impact on investment attractiveness, refer to [the Kazakhstan Energy Outlook 2024](#).

Another issue is the lack of stability in fiscal and regulatory terms. Investors are often deterred by the uncertainty surrounding long-term projects, as changes in tax policies or regulatory requirements can significantly impact profitability. This is particularly problematic for mature oilfields, whose margins are already thin, and any additional costs or uncertainties can render projects unviable. For instance, the recent environmental discussion surrounding the Kokzhide sands and Kokzhide groundwaters, allegedly contaminated by oil production, a critical underground water source, highlights the challenges of balancing resource extraction with environmental protection. The potential contamination of vital drinking water reserves has prompted [proposals to halt oil extraction in the area](#), which could [result in a loss](#) of 650,000 tons of oil production annually, reduced gas supplies, job losses for 3,250 workers, and a decline in budget revenues. These regulatory uncertainties and the pressing need for safe extraction technologies further complicate the investment landscape. Frequent or unpredictable changes in fiscal and regulatory regimes create a challenging environment for strategic planning, making it difficult for companies to commit to large-scale investments. Moreover, the lack of clear, long-term policies undermines investor confidence, as they are unable to accurately assess risks and returns. This uncertainty can lead to underinvestment for mature oilfields, which often require significant reinvestment to maintain production levels, further accelerating their decline and reducing overall output.

Technological advancements

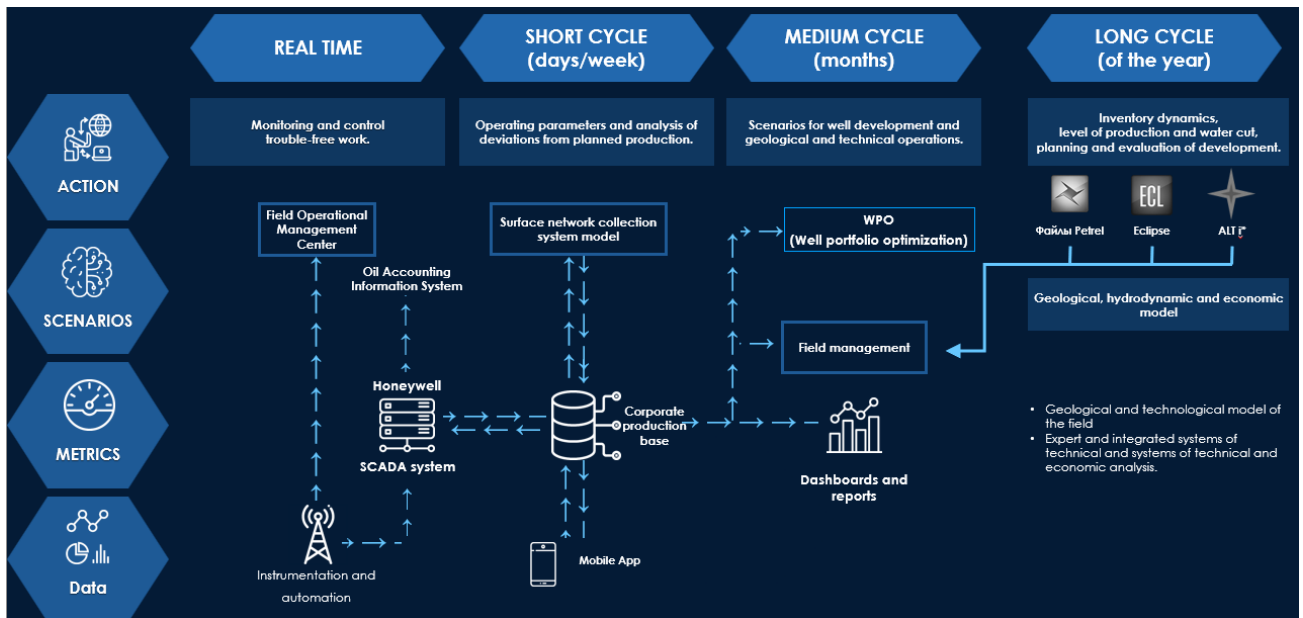
In addition to tax incentives and establishing clear, predictable guidelines for domestic supply obligations, technological advancements offer significant opportunities to enhance the productivity of Kazakhstan's mature oilfields. Implementing cutting-edge technologies, such as digitalization and enhanced oil recovery [EOR] techniques, can help extend the productive life of these oilfields and increase their output.

A notable example is the Smart Field Airankol project implemented by JSC Caspiy Neft, with the support of the Kazakhstani company Intelligent Digital Solutions LLP [IDS], which specializes in geology consulting and IT solutions for the oil and gas industry – developed both internally and in partnership with global vendors. As part of the Digital Almaty 2024 Forum, the MOU between IDS and SLB [Schlumberger] was signed, marking a significant milestone in mutual technological collaboration aimed at adapting integrated digital solutions to meet the specific requirements of the local market. This collaboration can significantly accelerate the development of Kazakhstan's IT companies and facilitate the joint implementation of advanced solutions for the country's Oil & Gas industry.

The project successfully demonstrated the potential of digital technologies to transform mature oilfields by using a phased approach to implementing digital oilfield technologies, providing a replicable model for converting mature oilfields into efficient, digitally enabled

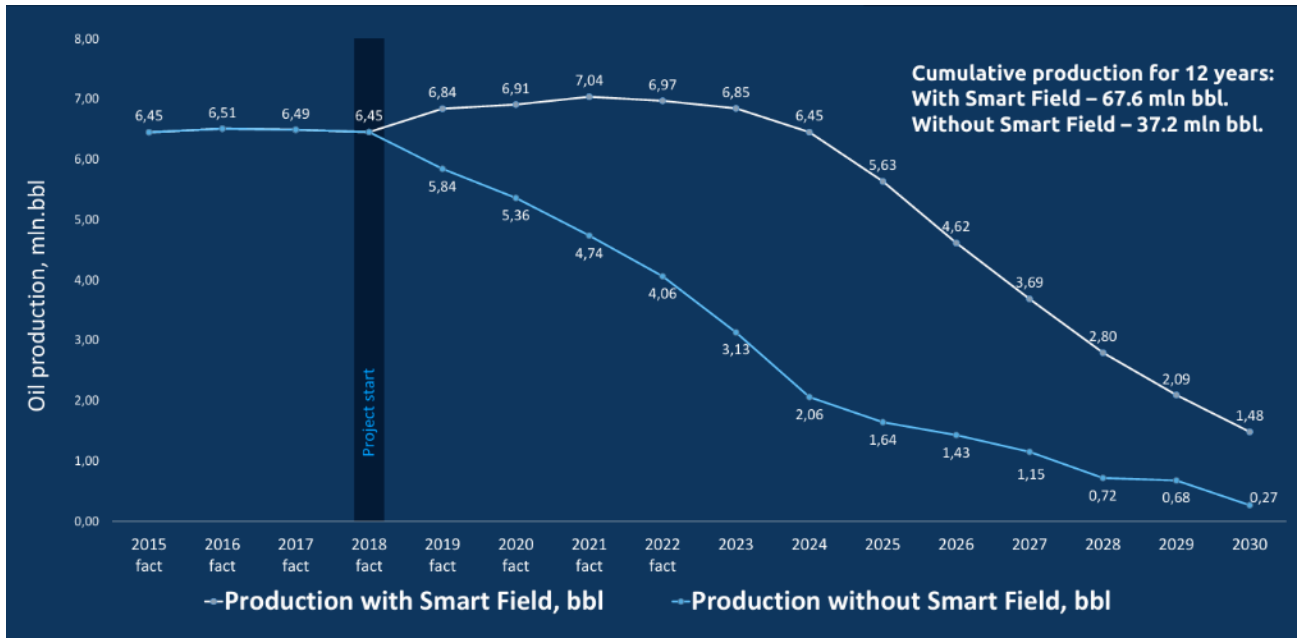
operations. The project roadmap outlined the following phases: Modernization, Automation, Telemechanization, Digitalization, and (finally) the Smart Field itself.

The solution architecture for the project (as shown in the figure below) is a comprehensive framework designed to optimize oilfield operations by integrating real-time data, advanced analytics and visualization, optimization models, and medium- and long-term planning.



Source: Intelligent Digital Solutions LLP

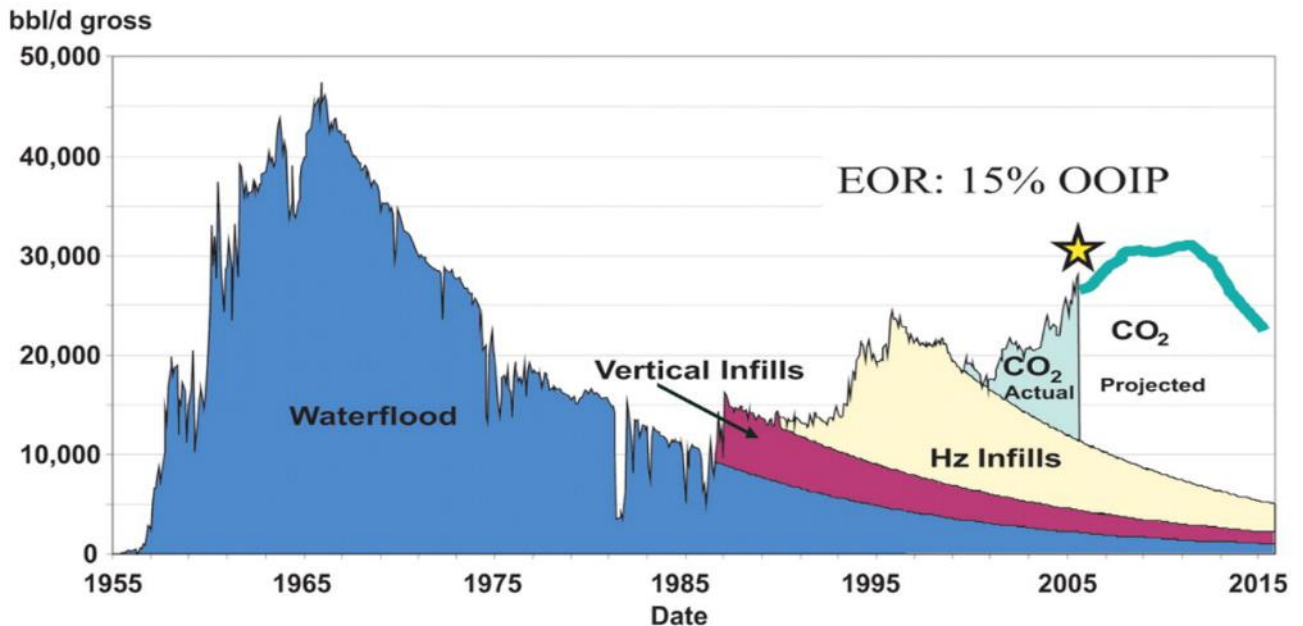
By integrating systems for automatic data collection, geological modeling, and machine learning-based optimization, [the project achieved](#) a 10% increase in oil production, a 30% reduction in production costs, and a 30% decrease in underground well repairs. Even as oil production gradually tapered off, the decline was significantly mitigated thanks to the project (see figure below). By 2030, cumulative production is expected to reach 67.6 million barrels over 12 years, which is 30.4 million barrels more than the production profile without the Smart Field project. These results highlight the potential of digitalization to improve operational efficiency and reduce costs, making mature oilfields more economically viable.



Source: Intelligent Digital Solutions LLP

Moreover, advanced EOR techniques, such as waterflooding, gas injection, and chemical treatments, can help recover additional reserves from mature oilfields, further enhancing their value. Investing in these technologies not only boosts production but also supports the development of a skilled workforce, as operators and service companies require specialized training to implement and manage these innovations.

E.g., CCUS+CO₂-EOR technology can be applied to many mature Kazakhstan oil fields. The core of this technology includes waste heat recovery units and carbon capture systems, followed by the injection of CO₂ into oil reservoirs to enhance oil recovery. This approach is widely used in the United States and other countries, offering a solution for both increasing oil recovery and reducing emissions. Successful examples of CCUS + CO₂-EOR technology include the Weyburn-Midale Project in Canada, where oil production increased by 10–15% while retaining significant amounts of CO₂ in the reservoir (see figure below), and the Permian Basin in the U.S., where CO₂ is extensively used to boost oil recovery in mature fields.



Source: Don White, (2009), "Monitoring CO2 storage during EOR at the Wehbyrn-Midale Field", The Leading Edge 28: 838-842.

Kazakhstan should also focus on fostering partnerships between local and international companies to facilitate the transfer of technology and expertise. For example, collaborations with local and global technology providers, such as the Smart Field Airankol project, can help local operators adopt best practices and modernize their operations. Additionally, the Government could incentivize research and development in oilfield technologies by offering grants or tax credits (e.g., [a 200% profit tax exemption for R&D expenses in the new Kazakhstan Tax Code project](#)) to companies that invest in innovation.

Value Contracts

Another innovative approach to revitalizing mature oilfields without transferring subsoil use rights is the potential introduction of value contracts. While this model has not yet been implemented in Kazakhstan, it offers a promising avenue to enhance the performance of mature oilfields through partnerships that align with the state's and private investors' interests.

Under a value contract framework, investors provide advanced technologies and operational expertise to improve productivity and efficiency. Compensation for investors is directly tied to measurable outcomes, such as incremental production or reduced costs. This performance-driven model ensures that both the state and investors share the benefits of increased efficiency while maintaining Kazakhstan's control over subsoil use rights. Such

contracts bypass the lengthy and complex procedures of transferring these rights, enabling faster implementation and reducing regulatory uncertainties.

Although Kazakhstan has no prior experience with value contracts, lessons from other countries can serve as a guide. For instance, Mexico and India have effectively used similar models to rejuvenate declining oilfields. These international examples emphasize the importance of well-defined contractual frameworks, risk-sharing mechanisms, and robust monitoring systems.

Adopting value contracts in Kazakhstan would require thoroughly examining global best practices to design a model that suits our regulatory, fiscal, and operational environment. The potential for such contracts to attract investment and enhance technological capabilities aligns with the broader goal of revitalizing mature oilfields.

Value contracts could be transformative in addressing the pressing challenges facing Kazakhstan's mature oilfields. By enabling partnerships between the Government, national operators, and private investors, this model can introduce advanced technologies such as enhanced oil recovery (EOR) and digitalization. These advancements can extend the productive life of mature oilfields, increase their output, and ensure their continued contribution to Kazakhstan's energy security.

The Bottom Line

Despite the challenges they face, Kazakhstan's mature oilfields represent a critical asset for the country's energy security and economic stability. These oilfields hold substantial reserves necessary to meet domestic energy demands and support local economies. However, to realize their full potential, it is essential to overcome significant barriers, including fiscal constraints, regulatory uncertainty, and challenges related to the internal market's pricing and supply obligations.

One of the most pressing issues is the unpredictability of domestic supply mandates, which often require producers to sell crude oil at prices below breakeven. This creates an unsustainable dynamic, discouraging investment and making it challenging to implement necessary technological upgrades. Addressing this issue through predictable and fair domestic supply policies is critical to improving the investment climate.

Solutions such as value contracts offer a promising path forward. These agreements allow investors to introduce advanced technologies and expertise to boost production while maintaining state control over subsoil resources. Value contracts align investor and national interests by tying compensation to measurable outcomes, creating a win-win scenario that encourages efficiency and innovation.

In addition, targeted fiscal reforms, such as revised tax regimes and stability clauses, coupled with the adoption of advanced technologies like digitalization and enhanced oil recovery, can further extend the productive life of mature oilfields and enhance their economic viability.

With the right combination of policy reforms, technological innovation, and strategic partnerships, Kazakhstan can revitalize its mature oilfields, ensuring their continued contribution to the country's energy supply and economic resilience. The challenges are significant, but the potential rewards—a secure and sustainable energy sector—make this a challenge worth addressing without delay.

ENERGY Insights & Analytics

Analytical center "ENERGY" LLP (ENERGY Insight & Analytics) is a joint venture between [the KAZENERGY Association](#) and IT company [AppStream](#). The company aims to become a priority source of data, analytical information, and recommendations for Kazakhstan's oil, gas, and electric power industries, allowing decision-makers to analyze and predict the most significant industry indicators with details on leading market players. Activities of ENERGY Insight & Analytics incorporate the whole analytics cycle with consequent stages: Descriptive, Diagnostic, Predictive, and Prescriptive analytics.

The key tool and product of ENERGY Insight & Analytics is internally developed software - [the Analytical Platform EXia](#), aimed to identify, localize, format, and present data most efficiently for the specified use cases.

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