Final Year Project Showcase Batch 2019
Year 2023

	Department: Petroleum Engineering Programme: Petroleum Engineering
1	**Project Idea** The final year design project (FYDP) titled "Optimum Development Strategies for Solution Gas and Water Drive Oil Reservoirs" aimed to address a critical challenge in the petroleum industry: maximizing oil recovery from solution gas and water drive oil reservoirs. The project involved the development of various strategies to enhance oil recovery by utilizing petroleum engineering concepts and reservoir modeling techniques. It was conducted in collaboration with industry experts from United Energy Pakistan Limited (UEPL).
2	**Process** 1. **Literature Review:** The project began with an extensive literature review to understand the existing strategies and challenges associated with oil recovery from solution gas and water drive oil reservoirs. This step helped in identifying gaps in current practices and potential areas for improvement. 2. **Concept Integration:** Pre-taught petroleum engineering concepts were integrated into the project's framework. These concepts served as the foundation for creating an analytical/numerical reservoir model. 3. **Reservoir Modeling:** A reservoir model was developed using analytical and numerical techniques. This model simulated the behavior of the solution gas and water drive oil reservoir under various conditions. 4. **Sensitivity Analysis:** Sensitivity runs were performed using the reservoir model to evaluate different scenarios and factors that influence oil recovery. Key factors included well count, the number of injector/producer wells, well location optimization, and the application of artificial lift and water-flooding techniques. 5. **Software Proficiency:** During the project, the team acquired proficiency in using specialized software tools such as Petrel and Eclipse. These software packages were essential for building and simulating the reservoir model, as well as for conducting the sensitivity analysis. 6. **Expert Supervision:** Throughout the project, industry experts from UEPL provided guidance and expertise, ensuring that the strategies and recommendations align with practical industry standards and requirements.
3	**Outcome** 1. **Optimum Reservoir Development Strategies:** The project identified and recommended optimum reservoir development strategies for solution gas and water drive oil reservoirs. These strategies aimed at maximizing oil recovery while considering various operational and economic constraints. 2. **Enhanced Understanding:** The project enhanced the team's understanding of complex petroleum engineering concepts and their practical applications in reservoir management and optimization. 3. **Software Proficiency:** The team gained proficiency in using industry-standard software tools (Petrel and Eclipse) for reservoir modeling and analysis, which is a valuable skill for future careers in the petroleum industry.

	4. **Industry Collaboration:** Collaboration with industry experts from UEPL provided valuable real-world insights and ensured that the project's outcomes were relevant and applicable to the field. 5. **Clean Energy Contribution:** By optimizing oil recovery sustainably, the project contributes to the global transition towards cleaner and more affordable energy, directly supporting SDG-7.
4	**Evidence (Theoretical Basis)** In our project, titled 'Optimum Development Strategies for Solution Gas and Water Drive Oil Reservoirs,' we harnessed the power of Petrel software to develop a suite of efficient reservoir development strategies with the incorporation of senstivity analysis on various factors namely; included well count, the number of injector/producer wells, well location optimization, and the application of artificial lift and water-flooding techniques. This endeavor emphasized environmental responsibility, with a commitment to zero waste throughout the project. Our analysis led us to identify the most effective strategy, involving the use of two artificial lifts. Importantly, the entire project was conducted through software simulations, ensuring a negligible environmental footprint. This project exemplifies our dedication to sustainable engineering practices, showcasing the potential for eco-conscious solutions in the petroleum industry while achieving optimal oil recovery.
5	**Impact on Sustainability of Urban Regions or SDG-11 "Sustainable Cities and Communities"** Our project, 'Optimum Development Strategies for Solution Gas and Water Drive Oil Reservoirs,' aligns with SDG-11, 'Sustainable Cities and Communities,' through responsible reservoir management, supported by advanced software like Petrel and Eclipse. This approach reduces environmental impact, conserves resources like water (smart and efficient well placements), minimizes urban disruptions through optimal well placements, and fosters economic sustainability. While our project focuses on reservoirs, it indirectly contributes to creating cleaner, more resilient urban environments, highlighting the interconnectedness of seemingly unrelated fields in promoting sustainable communities.
6	**Competitive Advantage or Unique Selling Proposition** SDG Alignment for Competitive Advantage: Our project's unique selling proposition lies in its alignment with Sustainable Development Goal (SDG) 11, "Sustainable Cities and Communities." By optimizing oil recovery through responsible reservoir management and advanced software simulations, we contribute to a cleaner urban environment with reduced environmental impact, minimized resource consumption, and fewer urban disruptions. This aligns with industry trends toward sustainability and positions our project as a valuable asset for companies seeking to enhance their environmental and social responsibility credentials while maintaining cost-effectiveness. Investing in our project offers not only market share growth potential but also a competitive edge in an industry increasingly prioritizing sustainable practices.
a	**Attainment of any SDG** (e.g. How it is achieved and why it is necessary for the region) Our project plays a pivotal role in achieving Sustainable Development Goal **SDG#07: Affordable and Clean Energy:** By optimizing oil recovery from solution gas and water drive oil reservoirs, we contribute to the availability of affordable energy resources, which is essential for regional development and prosperity. The attainment of SDG 7 is crucial for the region as it ensures a stable and cost-effective energy supply, driving economic growth, job creation, and improved living

	standards for communities. Furthermore, by reducing environmental impacts through responsible reservoir management, we align with SDG 7's clean energy aspect, promoting environmental sustainability in the region. This dual achievement not only addresses pressing energy needs but also supports environmental and economic well-being, making our project a strategic investment for both industry and regional development.
b	**Environmental Aspect** (e.g. carbon reduction, energy-efficient, etc.) Our project carries a significant environmental aspect, primarily centered on carbon reduction and energy efficiency. Through the implementation of optimized reservoir development strategies, we minimize the environmental impact associated with oil extraction operations. By reducing unnecessary drilling and employing efficient artificial lift methods, we mitigate carbon emissions, contributing to a lower carbon footprint. Additionally, our emphasis on responsible reservoir management translates into efficient resource utilization, conserving valuable water resources and promoting sustainable practices. This environmental focus not only aligns with industry trends towards greener operations but also positions our project as an eco-friendly and socially responsible initiative, which is vital in today's environmentally conscious landscape.
c	**Cost Reduction of Existing Product** Our project brings about a significant cost reduction potential for existing oil reservoir development operations. By optimizing strategies through advanced software simulations and responsible reservoir management, we streamline production processes, reducing operational inefficiencies and resource wastage. This cost reduction is achieved by minimizing unnecessary drilling, optimizing artificial lift methods, and conserving resources such as water. Moreover, our project's alignment with sustainability goals reduces long-term environmental liabilities and operational costs associated with environmental mitigation efforts. In summary, our project offers a compelling opportunity for cost savings while promoting environmentally responsible practices, making it an attractive proposition for companies seeking to enhance their profitability and sustainability simultaneously.
d	**Process Improvement which Leads to Superior Product or Cost Reduction, Efficiency Improvement of the Whole Process** (e.g. What is the issue is current process and what improvement you suggests) Our project introduces a transformative process improvement that not only leads to a superior product but also drives cost reduction and efficiency enhancement across the entire reservoir development process. The primary issue in the current process is the suboptimal utilization of resources, leading to inefficiencies, increased costs, and environmental impact. Our proposed improvement involves the utilization of advanced software simulations, such as Petrel and Eclipse, for reservoir management. This innovation allows for precise modeling and optimization, reducing the need for excessive drilling and resource consumption. Additionally, our project recommends efficient artificial lift methods and responsible reservoir development strategies, which minimize waste and operational inefficiencies. By addressing these issues and implementing our suggested improvements, companies can achieve substantial cost reductions, enhanced operational efficiency, and a superior product with higher oil recovery rates. This transformation not only aligns with industry trends but also positions our project as a strategic investment for those seeking to remain competitive, reduce costs, and improve their environmental footprint.
e	**Expanding of Market share** (e.g. how it expand and what is the problem with the current market Our project offers a strategic pathway for expanding market share within the oil and gas industry. The current market faces challenges related to increasing competition, fluctuating

	oil prices, and growing environmental concerns. These factors have made it essential for companies to seek innovative solutions to gain a competitive edge. Our project's unique selling proposition lies in its ability to optimize oil recovery through advanced reservoir management techniques and software simulations. By implementing our recommended strategies, companies can improve their production efficiency and reduce operational costs. This not only allows them to maintain competitiveness in a volatile market but also positions them as leaders in adopting environmentally responsible practices. Expanding market share is achievable through our project by offering a clear advantage over competitors. Companies that embrace these strategies can increase their oil recovery rates, reduce their carbon footprint, and enhance their sustainability profile, making them more attractive to investors and customers alike. Our project thus represents a promising opportunity for market expansion and long-term growth within the oil and gas sector.
f	**Capture New Market** (e.g. Niche market or unaddressed segment) Our project opens the door to capturing new markets, specifically within niche segments or unaddressed areas of the oil and gas industry. The current market landscape often overlooks the potential for sustainable and environmentally responsible reservoir development strategies. Our project's unique selling proposition lies in its alignment with sustainability goals, notably Sustainable Development Goal 11, which focuses on creating "Sustainable Cities and Communities." By optimizing oil recovery through advanced software simulations and responsible reservoir management, we cater to a growing demand for sustainable energy solutions and eco-conscious practices. Companies that adopt our strategies can target niche markets or previously unaddressed segments, such as environmentally conscious investors, energy consumers, and regions where sustainable practices are a priority. This expansion into new markets not only diversifies revenue streams but also positions companies as leaders in addressing evolving market demands for environmentally friendly and socially responsible energy solutions. In essence, our project offers a strategic avenue for market expansion into previously untapped segments, aligning with the industry's shifting priorities toward sustainability.
g	**Any Other Aspect (Please tag it like above options)** Our project introduces a critical aspect of technological advancement to modernize the oil and gas industry. In an era where digital transformation is revolutionizing various sectors, the energy industry is no exception. The current practices often rely on traditional methods, which can be inefficient and resource-intensive. Our project incorporates advanced software tools like Petrel and Eclipse, ushering in a new era of reservoir management. By harnessing the power of these tools for precise modeling and optimization, companies can modernize their operations, improving decision-making and overall efficiency. This technological advancement not only streamlines existing processes but also enhances the industry's competitiveness and resilience in the face of evolving global energy demands. By investing in our project, companies can position themselves at the forefront of industry modernization, staying ahead of the curve and preparing for a sustainable future.
7	**Target Market** (Industries, Groups, Individuals, Families, Students, etc) Please provide some detail about the end-user of the product, process, or service The primary target market for our project, "Optimum Development Strategies for Solution Gas and Water Drive Oil Reservoirs," comprises oil and gas companies operating in solution gas and water drive oil reservoirs. These companies span various sizes and scales, from large multinational corporations to smaller regional operators. Our project's strategies are

	designed to be adaptable and scalable, making them suitable for a broad range of industry players. Additionally, our project is of interest to energy investors and stakeholders seeking sustainable and environmentally responsible opportunities in the energy sector. With a growing emphasis on ESG (Environmental, Social, and Governance) criteria in investment decisions, our project's alignment with SDGs and sustainability goals makes it appealing to investors who prioritize ethical and eco-conscious practices. By targeting these markets, we aim to offer practical solutions that enhance oil recovery, reduce operational costs, and minimize environmental impact, while also appealing to those who value sustainability and responsible resource management in the energy industry.	
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