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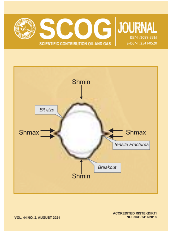

Oil and Gas in the Dynamics of Time and Development

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ABSTRACT - As a source of energy, industrial raw materials, and foreign exchange for exports, the oil and gas sub-sector has a strategic role in national development. In the period 2020-2024, the management and utilization of oil and gas resources will face several challenges. The purpose of this study is to determine the profile of oil and gas development. The method used and the description in the data is qualitative. The results of this study allow us to statistically understand cluster dynamics. The impact of this research is to map the dynamics of oil and gas as a whole.

Keywords: Strategic, dynamics, oil and gas.

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INTRODUCTION

Due to the continuous growth of energy demand and the limitation of fossil resources, biogas as a renewable energy source is considered to be one of the alternative methods to meet energy demand. In Europe, the European Commission has proposed a comprehensive plan for energy and climate change, which includes a mandatory target of setting the proportion of renewable energy at 20% by 2020, and the European Union has adopted the 2030 Climate and Energy Framework, which sets 27% of renewable energy consumption. As a traditional agricultural country, China has produced abundant biogas resources from agriculture and related production activities. In 2010, China's annual biogas production has increased to 248 billion cubic meters. In 2012, China produced 846 million tons of crop residues and 3.21 billion tons of livestock and poultry manure. If these wastes are used for anaerobic fermentation, 4.23x1011 m3 of biogas can be produced. Therefore, the area of biogas exceeds 1.2x106 square kilometers and the grassland area is 3.9x106 square kilometers. Biogas has great potential in realizing China's social and economic development and environmental improvement.

China's biogas resources have huge potential, and the distributed energy system (DES) based on micro gas turbines provides an effective way for biogas utilization. In this work, numerical and experimental studies on the turbulent combustion characteristics in the combustor of a micro gas turbine used in DES were carried out, and the influence of carbon dioxide content in biogas on the turbulent flame was analyzed. Through the three-dimensional (3D) combustion diagnosis technology based on computer tomography chemiluminescence

(CTC), the turbulent flame structure of natural gas and three kinds of biogas at various equivalence ratios were measured.

The results show that the carbon dioxide content in the fuel has a great influence on the flame structure of turbulent combustion. The increase of the carbon dioxide content in the fuel not only reduces the turbulent combustion rate, but also makes the combustion stability worse. As the equivalence ratio decreases, the effect becomes greater. As the volume fraction of carbon dioxide increases, the combustion flame gradually moves away from the nozzle outlet. When the volume fraction of carbon dioxide is 50%, the distance between the combustion flame and the nozzle outlet increases by 100 mm. In addition, carbon dioxide reduces the influence of excess air on CH* distribution and turbulent flames (Liu, *et al.*, 2020).

In 2006, one of the largest oil provinces in the world, known as thepre-salt, was discovered in Brazil. The hydrocarbon reservoirs consist of carbonaceous rocks of microbial origin and underlie a thick layer of saltrock with an average thickness of 2000 m, in a water depth of 2200 m,at ~300 km from the coast. The oil in the reservoirs is of high quality with a remarkably high gas-oil ratio, above 220. The associated gas hasa high CO_2 content of mantle origin, which cannot be ventilated in theatmosphere. shows a typical geology section of the pre-salt reservoirs of the pre-salt reservoirs.The produced gas with high content of CO_2 is treated at the production platform through membrane filters. Part of the treated gas iscompressed and transported to shore through gas pipelines. The remainder gas with high content of CO_2 is reinjected into the reservoirs,working as EOR (Enhanced Oil Recovered) in the initial age of thereservoirs production.

With time the recycled gas with CO_2 increases the global CO_2 content of the associated gas. Therefore, there is a demand for CCS of large quantities of CO_2 associated with CH4 in the presalt offshore oil fields in Brazil.Salt has been identified as one of the best geological media forunderground storage of gas at high pressure (about 2000−3000 m ofrock depth and 2200 m of water depth). The main reasons include: (i)low permeability, the permeability of rock salt is about 10-21 - 10-24m^2, thus can provide excellent sealing of the salt cavern; (ii) goodmechanical properties, damage self-recovery capability of rock salt canensure the safety of salt cavern with frequent changes of gas pressure;(iii) solution in water, rock salt is easily dissolved into water, which facilitates the construction and shape control of the salt cavern; (iv) abundant resources, as it is overlying the pre-salt reservoirs (Goulart, *et al.*, 2020)which performs all the offshore natural gas and CO_2 separation process with subsequent storage in offshore underground salt caverns. Currently there is a demand for CCS of large quantities of CO_2 associated with CH4 in the pre-salt offshore oil fields in Brazil. The pre-salt reservoirs have as caprock 2000 m of continuous rock salt. This hybrid system is expected to perform, at the same time, the separation between the natural gas and CO_2, and Carbon Capture and Storage of CO_2, allowing the monetization of the separated natural gas. The Technology Readiness Levels (TRL.

Natural gas hydrates (NGHs) are white crystalline compounds formed by the interaction of light hydrocarbons, carbon dioxide,and hydrogen sulfide with water under low-temperature and high pressure coexisting conditions. Natural gas hydrate develops and exists in pores of soil sediments under deep seabed and permafrost regions, where the low-temperature and high-pressure condition guarantees the NGH generation and stability. NGH is regarded as having the most potential as alternative energy in the 21st century because of its huge potential. In recent decades, it has been a worldwide upsurge in terms of exploration, production, and development. At present, common methods of NGH exploitation include depressurization, thermal stimulation, inhibitor injection, CO_2 replacement, and solid fluidization mining methods. However, these exploitation methods have some limitations for NGH reservoirs, which are characterized by shallow burial depth, non-trap structure,low consolidation strength, non-diagenesis, and low permeability. Hydrate secondary formation and ice formation are easily caused by depressurization, which may block the permeability path of the non-diagenetic NGH reservoirs and be unfavorable for long-term exploitation.For the inhibitor injection method, injection of the chemical reagents for hydrate-bearing sediments (HBSs) is not economical, and the low permeability of the NGH reservoirs will lead to the slow action of chemical reagents on NGH formation and may induce stratigraphic disasters.6Besides, owing to the weak cementation of the hydrate reservoirs, the above three exploitation methods are based on the principle of direct decomposition of NGH, which easily causes the instability of the formation 6 Concerning the CO_2 replacement method, the production period is long, and similarly, the low permeability of the NGH reservoirs has a great impact on mining efficiency. The exploitation of NGH reservoirs is still in the theoretical and experimental stages. Many countries, including the United States, Japan, Korean, China, and India, have launched ambitious national projects to the further exploitation of NGH reservoirs and obtained valuable experimental data and experience, but due to the problems of low production and formation sand production, noncommercial exploitation of natural gas hydrate has been achieved. In October 2019, China launched the second NGH trial production with the horizontal well in the Shenhu area of the South Chinese and obtained 860 000 m3 of natural gas, which is four times the amount of gas produced by the last trial in 2017. The reason is the horizontal section that greatly expanded the scope of influence of the production well (Zhang, *et al.*, 2020).

Fine-scale movement data has transformed our knowledge of ungulate migration ecology and now provides accurate, spatially explicit maps of migratory routes that can inform planning and management at local, state, and federal levels. Among the most challenging land use planning issues has been developing energy resources on public lands that overlap with important ungulate habitat, including themigratory routes of mule deer (Odocoileus hemionus). We generally know that less development is better forminimizing negative effects and maintaining habitat function, but we lack information on the amount ofdisturbance that animals can tolerate before reducing use of or abandoning migratory habitat. We used global positioning system data from 56 deer across 15 years to evaluate how surface disturbance from natural gas well pads and access roads in western Wyoming, USA, affected habitat selection of mule deerduring migration and whether any disturbance threshold(s) existed beyond which use of migratory habitat declined. We used resource and step selection functions to examine disturbance thresholds at 3 differentspatial scales. Overall, migratory use by mule deer declined as surface disturbance increased. Based on the weight of evidence from our 3 independent but complementary metrics, declines in migratory use related to surface disturbance were non-linear, where migratory use sharply declined when surface disturbance from energy development exceeded 3%. Disturbance thresholds may vary across regions, species, or migratory habitats (e.g., stopover sites). Such information can help with management and land use decisions related to mineral leasing and energy development that overlap with the migratory routes of ungulates (Sawyer, *et al.*, 2020).

Adverse price trends and sharp fluctuations not only affect profit margins, but also affect the likelihood of default or even change investment incentives (eg, infrastructure and transportation) - reducing investment in favor of low risk projects. Business challenges that are directly related to, inter alia, production / purchasing costs, revenue, and availability of credit, create the need for coherent risk management practices. For oil and gas projects, where cash flows are generated almost entirely by sales of oil and gas, the volatility of prices increases the incentive to mitigate this impact. An effective natural gas hedging strategy is relevant in reducing price volatility for investors, traders, producers and commercial users in this sector. In addition, hedging policies are a key theme for policy makers and regulators to consider alternative reforms and reduce deficiencies (eg, transaction costs, poor liquidity and transparency) in the current market design. In addition, with the Paris Agreement in 2015 and its predecessor the Kyoto Protocol in 1997, there has been increasing interest in investing in low-emission energy, such as natural gas. Therefore, given the large economic and financial impact of natural gas volatility, it is important to study natural gas risk management strategies. One important parameter of future-based hedging is the hedge ratio, which is the number of forward contracts to be bought or sold for each unit. of the underlying asset for which the hedge bears the risk. Previous studies (eg, Ederington, 1979) found hedge ratios that minimize spot / future portfolio variance based on the principles of portfolio theory. The Optimum Hedging Ratio (OHR) is usually found by regressing the returns for holding physical assets against the returns that hold the hedged instrument. However, the regression approach has several drawbacks (Pouliasis, *et al.*, 2020).

DATA AND METHODS

This review will be conducted using a systematic literature review. This method will help identify and make it easier for researchers to review the previous research literature. This systematic literature review was adopted from (Tranfield, Denyer, &

Smart, 2003) which makes it easier for researchers to determine inclusions that match the research theme and carry out an exclusion process that is not in accordance with the research recommendations. The use of this methodology will make it easier for researchers to obtain a comprehensive scope of literature. The methodology uses 5 stages to facilitate the literature review process, namely planning, searching, filtering, extraction, and synthesis, including reporting.

Planning Researchers try to make plans in research to be able to define research questions. The research question in this research is "What is Oil and Gas?". Answers to research questions will facilitate the content and see the theory and practice that occurs. The next step here is to identify the research database and use key strings to find an appropriate electronic database for the research question.

Search The search process for related articles for this research question was carried out using 1 electronic database: Scopus. The selection of this article is based on articles that provide good presentations on oil and gas intentions, and related empirical research. The keywords used in this study are "oil and gas". Researchers use these keywords in order to be able to see broadly about the intentions of oil and natural gas so that they can answer generally to specific research questions (Suryadilaga, *et al.*, 2019).

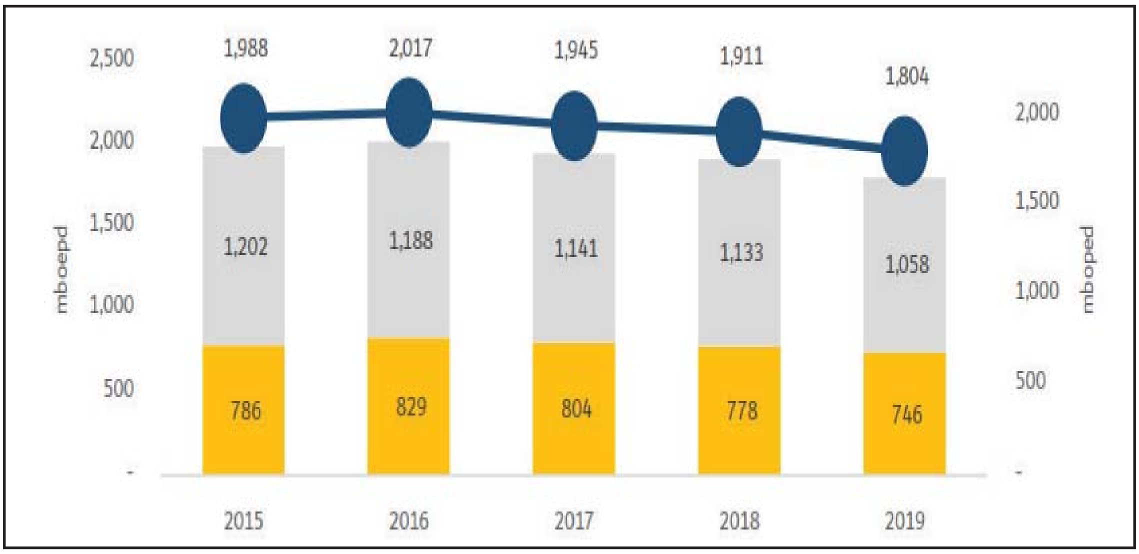

Figure 1
Realization of oil and gas lifting.

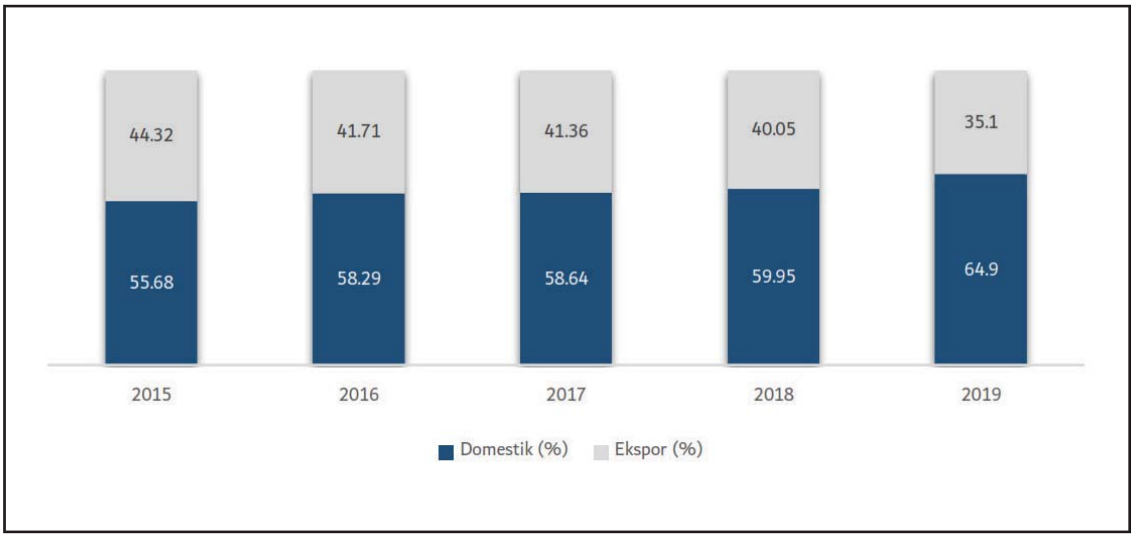

Figure 2
Utilization of natural gas.

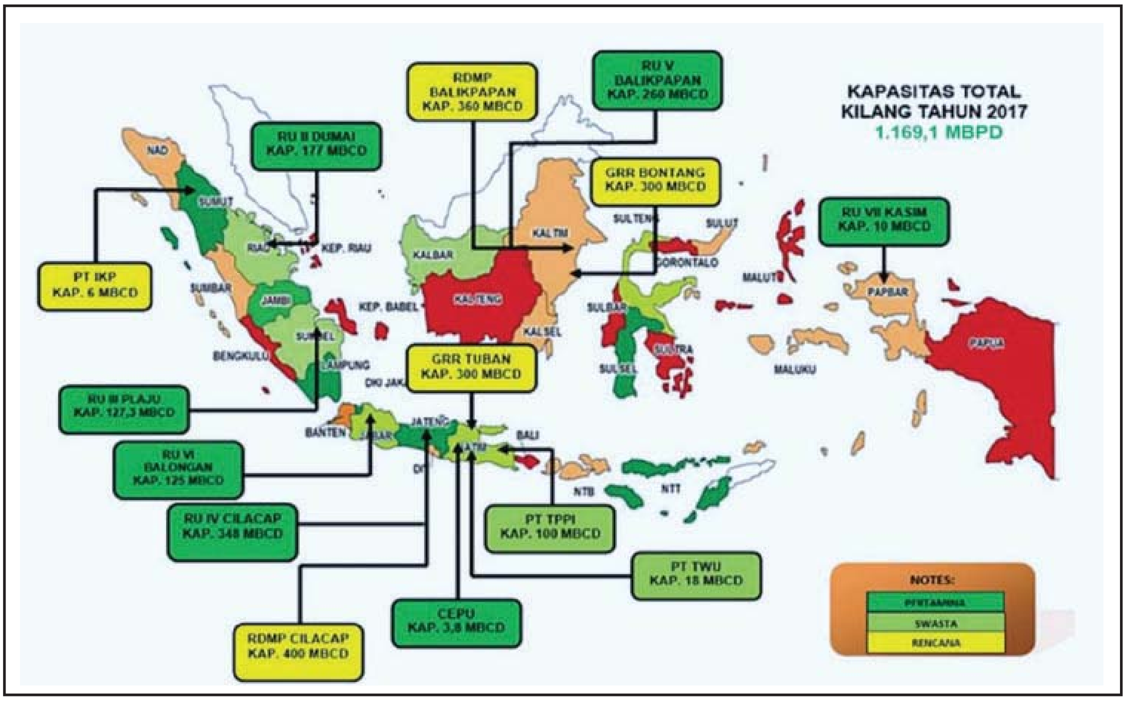

Figure 3
Oil refinery capacity.

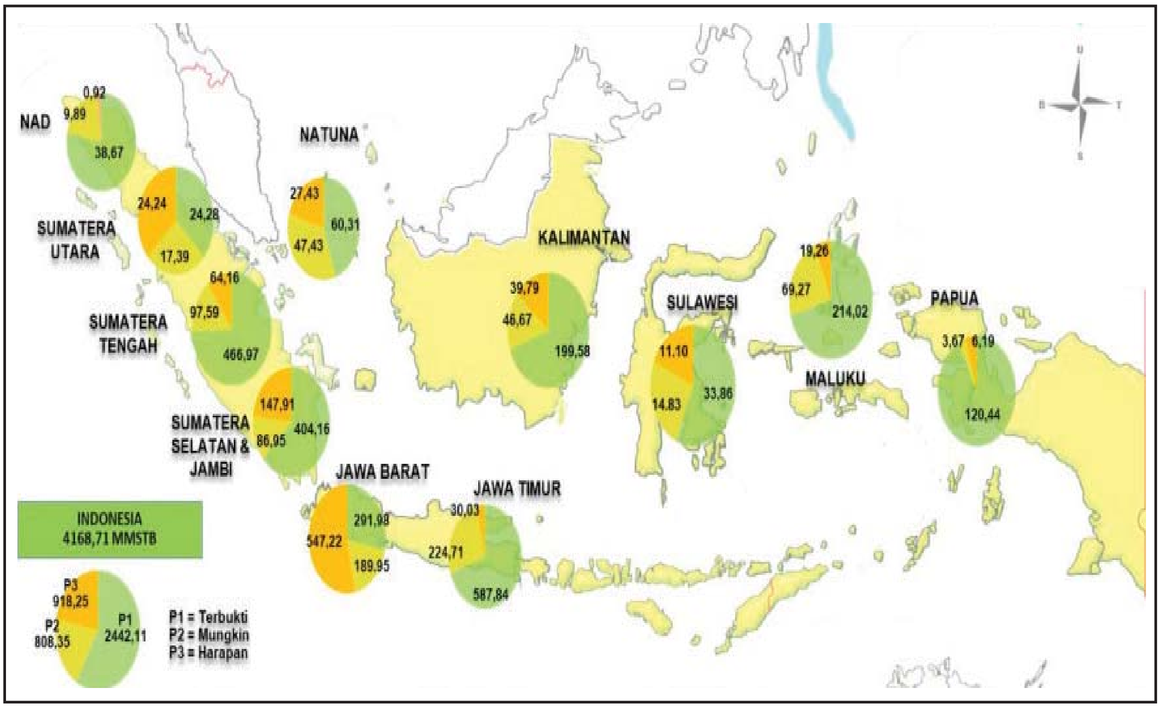

Figure 4
Map of petroleum reserves in 2020.

RESULTS AND DISCUSSION

The early 2015-2019 period was a period full of challenges in increasing oil and gas lifting. The global recession caused oil prices to fall dramatically and exchange rates were volatile. This problem can be resolved by issuing an Economic Policy Package by the Government so as to create conducive investment conditions. With the issuance of the Economic Policy Package, Cooperation Contract Contractors (KKKS) can invest in exploitation and production. This also changes the direction of the oil and gas subsector policy, namely from increasing the lifting of oil and

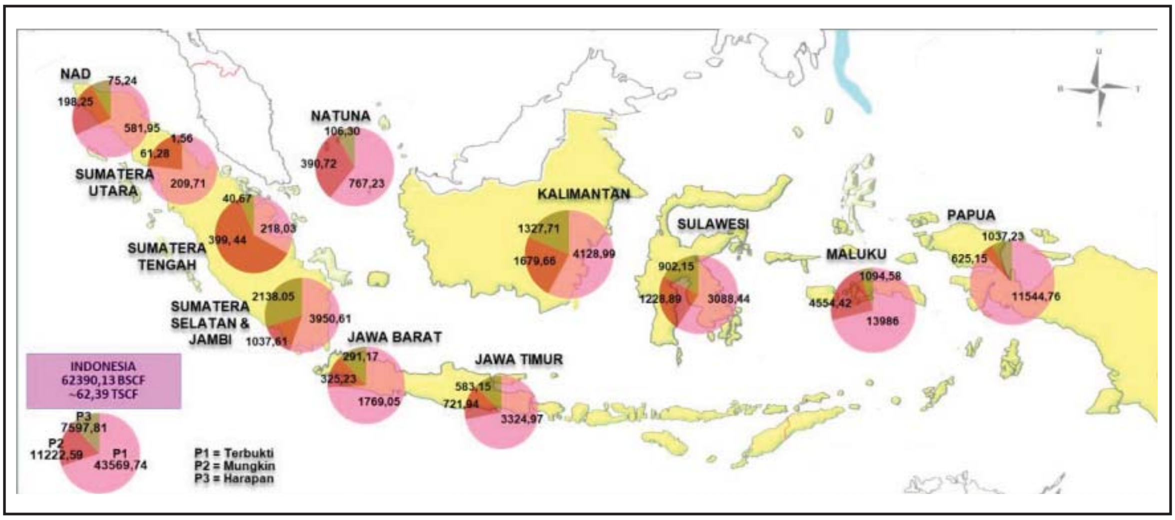

Figure 5
Map of natural gas reserves in 2020.

gas to the supply of oil and gas energy so that one of the challenges is how to maintain how production, currency exchange rates and, raise oil and gas. The performance of oil and gas lifting from 2015-2019 has decreased due to facing many errors in the field, both in operations, development activities, and other non-technical matters. The ongoing coordination among all stakeholders including oil and gas producing regions throughout Indonesia is expected to be able to maintain and increase oil and gas production in the next period.

The implementation of natural gas business activities aims to make the largest contribution to the national economy and to develop and strengthen the position of Indonesia's industry and trade. Currently, the natural gas management paradigm is implemented with energy as a driving force for the economy to provide a multiplier effect on the people's economy.

The construction of the FSRU / Regasification Unit / LNG Terminal is carried out to facilitate the distribution of natural gas between regions in Indonesia, which is an archipelagic country. In the period 2015 to 2019, Indonesia has built 3 (three) FSRU facilities that have been operating, namely the Arun-Belawan FSRU in Aceh, the Lampung FSRU, and the Tanjung Benoa FSRU in Bali. to meet domestic needs and growing LNG business opportunities.

CONCLUSIONS

Even though it has been decreasing in recent years, Indonesia's oil and gas potential is still growing. To date, out of a total of 128 basins, only about 47% have been explored, with the status of 16% or 20 basins already in production, 21% or 27 basins have been drilled and found oil, and 10% or 13 basins have been drilled but no oil has been found. There are still 53% or 68 more sedimentary basins, mostly in Eastern Indonesia, waiting to be discovered.

In Eastern Indonesia, geological and geophysical survey (G&G) activities are primarily aimed at obtaining new data in areas where exploration activities have not been touched and with minimal data (frontier basin). Meanwhile, in the Western Region of Indonesia, which has produced more basins, a survey was conducted to look for other potentials beyond the current exploration concept.

Petroleum reserves from 8.21 billion barrels in 2008 fell to the range of 3.8 billion barrels in 2019 (in 2019 there was a change in the method of calculating oil reserves). Reserve to Production (calculated against proven reserves) is in the range of 9 years. There was an increase to 12 years in 2014 due to the significant addition of proven oil reserves, especially from the Banyu Urip Cepu Field. Furthermore, the decline in world oil prices in 2015 is seen as one of the factors in the low new reserves discoveries.

Natural gas reserves in 2008 were 170 TSCF and continued to fall to the range of 77.29TSCF in 2019. Indonesia's natural gas Reserve to Production (against proven reserves) was 18.8 years. Considering that oil and natural gas are still the dominant energy in the use of national energy, several efforts to increase oil and gas reserves are always being pursued. To increase the number of reserves, contractors need to make efforts to discover new reserves that can be done by expanding the search area for oil and gas reserves by carrying out exploration drilling and seismic surveys as well as G&G studies.

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GLOSSARY OF TERMS

Symbol	Definition	Unit
DES	Distributed Energy System	
3D	Three-Dimensional	
CTC	Computer Tomography Chemiluminescence	
EOR	Enhanced Oil Recovered	

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