# Journal of Earth Energy Engineering

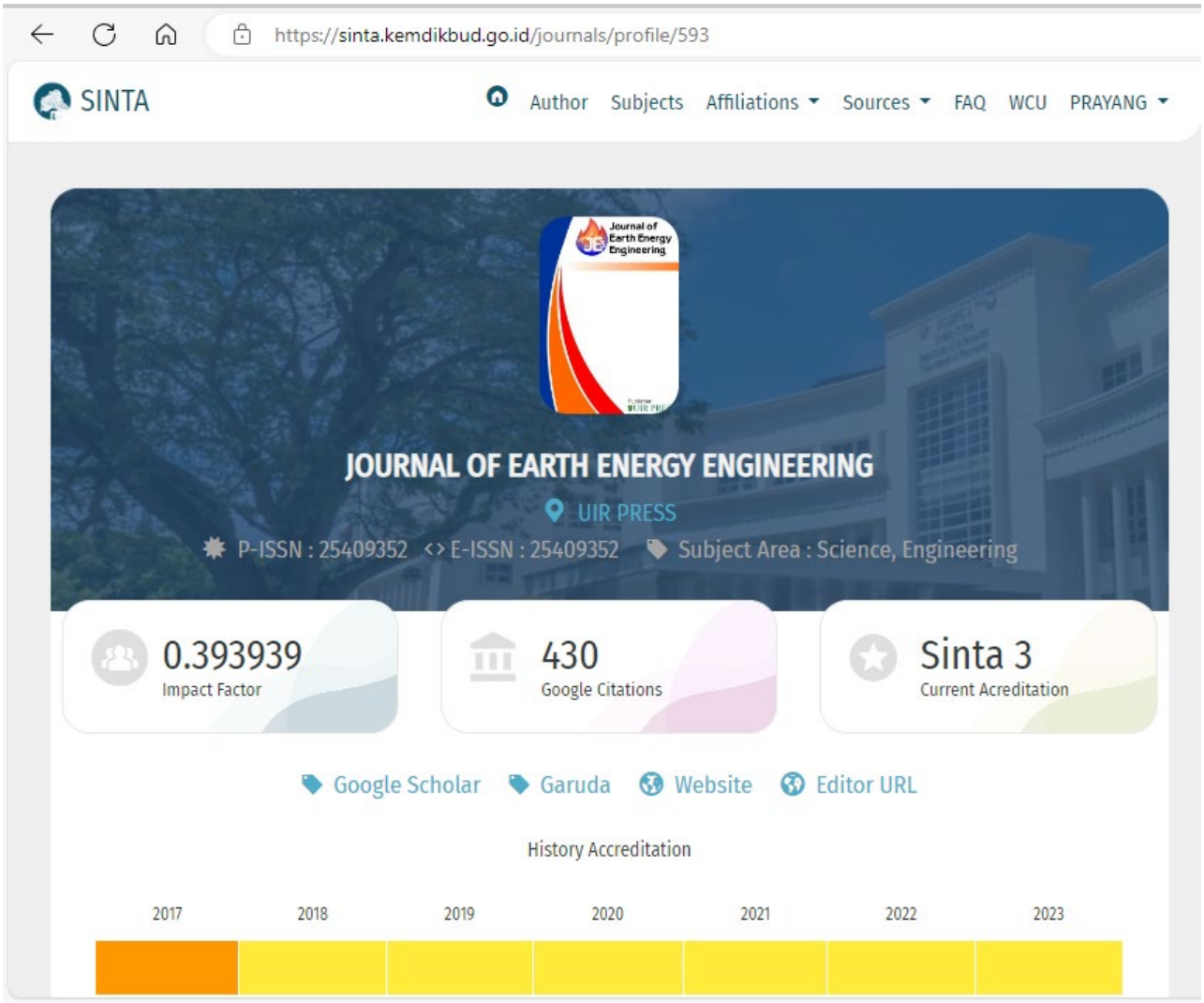
P-ISSN 2301-8097
E-ISSN 2540-9352

VOL. 12 NO. 2, OCTOBER 2023





Publisher
UIR PRESS


https://sinta.kemdikbud.go.id/journals/profile/593
SINTA
Author
Subjects
Affiliations
Sources
FAQ
WCU
PRAYANG
JOURNAL OF EARTH ENERGY ENGINEERING
UIR PRESS
P-ISSN : 25409352
E-ISSN : 25409352
Subject Area : Science, Engineering
0.393939
Impact Factor
430
Google Citations
Sinta 3
Current Acreditation
Google Scholar
Garuda
Website
Editor URL
History Accreditation
2017
2018
2019
2020
2021
2022
2023

KEMENTERIAN RISET, TEKNOLOGI, DAN PENDIDIKAN TINGGI
**DIREKTORAT JENDERAL PENGUATAN RISET DAN PENGEMBANGAN**
Jl. M.H Thamrin No. 8 Jakarta Pusat 10340 Gedung BPPT II lt 19-20
Telepon (021) 316-9804/9805, Faksimil (021) 3101728, 3102368
www.ristekdikti.go.id

SALINAN

KEPUTUSAN DIREKTUR JENDERAL PENGUATAN RISET DAN PENGEMBANGAN
KEMENTERIAN RISET, TEKNOLOGI, DAN PENDIDIKAN TINGGI
REPUBLIK INDONESIA

NOMOR 10/E/KPT/2019

TENTANG

PERINGKAT AKREDITASI JURNAL ILMIAH PERIODE II
TAHUN 2019

DIREKTUR JENDERAL PENGUATAN RISET DAN PENGEMBANGAN
KEMENTERIAN RISET, TEKNOLOGI, DAN PENDIDIKAN TINGGI,

Menimbang : a. bahwa berdasarkan hasil akreditasi jurnal ilmiah yang ditetapkan oleh Tim Akreditasi Jurnal Ilmiah Kementerian Riset, Teknologi, dan Pendidikan Tinggi pada tanggal 2 April 2019 dan dalam rangka melaksanakan ketentuan Pasal 6 ayat (5) Peraturan Menteri Riset, Teknologi, dan Pendidikan Tinggi Nomor 9 Tahun 2018 tentang Akreditasi Jurnal Ilmiah, perlu menetapkan Peringkat Akreditasi Jurnal Ilmiah Periode II Tahun 2019;

b. bahwa berdasarkan pertimbangan sebagaimana dimaksud pada huruf a, perlu menetapkan Keputusan Direktur Jenderal Penguatan Riset dan Pengembangan Kementerian Riset, Teknologi, dan Pendidikan Tinggi tentang Peringkat Akreditasi Jurnal Ilmiah Periode I Tahun 2019;

Mengingat : 1. Undang-Undang Nomor 12 Tahun 2012 tentang Pendidikan Tinggi (Lembaran Negara Republik Indonesia Tahun 2012 Nomor 158, tambahan Lembaran Negara Republik Indonesia Nomor 5336);

2. Peraturan Pemerintah Nomor 4 Tahun 2014 tentang Penyelenggaraan Pendidikan dan Pengelolaan Perguruan Tinggi (Lembaran Negara Republik Indonesia Tahun 2014, Nomor 16, tambahan Lembaran Negara Republik Indonesia Nomor 5500);

3. Peraturan Presiden Nomor 13 Tahun 2015 tentang Kementerian Riset, Teknologi, dan Pendidikan Tinggi (Lembaran Negara Republik Indonesia Tahun 2015 Nomor 14);

4. Keputusan Presiden Nomor 121/P Tahun 2014 tentang Pembentukan Kementerian dan Pengangkatan Menteri Kabinet Kerja Periode Tahun 2014-2019;

5. Keputusan Presiden Nomor 99/M Tahun 2015 tentang Pemberhentian dan Pengangkatan Dari dan Dalam Jabatan Pimpinan Tinggi Madya di Lingkungan Kementerian Riset, Teknologi, dan Pendidikan Tinggi;
6. Peraturan Menteri Keuangan Republik Indonesia Nomor 32/PMK.02/2018 tentang Standar Biaya Masukan Tahun Anggaran 2019;
7. Peraturan Menteri Riset, Teknologi dan Pendidikan Tinggi Nomor 15 Tahun 2015 tentang Organisasi dan Tata Kerja Kementerian Riset, Teknologi dan Pendidikan Tinggi (Berita Negara Republik Indonesia Tahun 2015 Nomor 889);
8. Peraturan Menteri Riset, Teknologi dan Pendidikan Tinggi Nomor 9 Tahun 2018 tentang Akreditasi Jurnal Ilmiah (Berita Negara Republik Indonesia Tahun 2018 Nomor 428);
9. Keputusan Direktur Jenderal Penguatan Riset dan Pengembangan Nomor 19 Tahun 2018 tentang Pedoman Akreditasi Jurnal Ilmiah;

MEMUTUSKAN:

Menetapkan : KEPUTUSAN DIREKTUR JENDERAL PENGUATAN RISET DAN PENGEMBANGAN KEMENTERIAN RISET, TEKNOLOGI, DAN PENDIDIKAN TINGGI TENTANG PERINGKAT AKREDITASI JURNAL ILMIAH PERIODE II TAHUN 2019.

KESATU : Menetapkan Peringkat Akreditasi Jurnal Ilmiah Periode II Tahun 2019 sebagaimana tercantum dalam Lampiran yang merupakan bagian yang tidak terpisahkan dari Keputusan Direktur Jenderal ini.

KEDUA : Akreditasi Jurnal Ilmiah sebagaimana dimaksud dalam Diktum KESATU berlaku selama 5 (lima) tahun mulai dari nomor yang ditetapkan dalam lampiran keputusan ini.

KETIGA : Akreditasi Jurnal Ilmiah sebagaimana dimaksud dalam Diktum KESATU dapat mengajukan kembali kenaikan peringkat setelah menerbitkan minimal 1 (satu) nomor penerbitan.

KEEMPAT : Setiap jurnal ilmiah wajib mencantumkan masa berlaku akreditasi dengan menuliskan tanggal penetapan dan tanggal akhir masa berlaku akreditasi.

KELIMA : Apabila dikemudian hari ditemukan ketidaksesuaian dengan Pedoman Akreditasi Jurnal Ilmiah, maka status akreditasi jurnal ilmiah yang bersangkutan dapat dicabut atau diturunkan.

KEENAM : Keputusan Direktur Jenderal ini mulai berlaku pada tanggal ditetapkan.

Ditetapkan di Jakarta
pada tanggal 4 April 2019

DIREKTUR JENDERAL
PENGUATAN RISET DAN PENGEMBANGAN,

TTD.

MUHAMMAD DIMYATI
NIP 195912171984041001

Salinan sesuai dengan aslinya,
Direktorat Jenderal Penguatan Riset dan Pengembangan
Kementerian Riset, Teknologi, dan Pendidikan Tinggi
Kepala Bagian Hukum, Kerjasama, dan Layanan Informasi,

Syarip Hidayat
NIP 197306101997031004

SALINAN
LAMPIRAN
KEPUTUSAN DIREKTUR JENDERAL PENGUATAN RISET DAN PENGEMBANGAN KEMENTERIAN RISET, TEKNOLOGI, DAN PENDIDIKAN TINGGI
NOMOR 10/E/KPT/2019
TENTANG PERINGKAT AKREDITASI JURNAL ILMIAH PERIODE II TAHUN 2019

PERINGKAT AKREDITASI JURNAL ILMIAH PERIODE II TAHUN 2019

| Peringkat | No | Nama Jurnal | E-ISSN | Penerbit | Keterangan |
|---|---|---|---|---|---|
| 2 | 1 | Adabiyyat: Jurnal Bahasa dan Sastra | 25492047 | Fakultas Adab dan Ilmu Budaya UIN Sunan Kalijaga | Reakreditasi tetap di peringkat 2 mulai volume 2,nomor 1, tahun 2018 |
| | 2 | Akrual: Jurnal Akuntansi | 25026380 | Universitas Negeri Surabaya | Reakreditasi naik peringkat dari peringkat 3 ke 2 Mulai Volume 9, Nomor 2 Tahun 2018 |
| | 3 | Al-'Adalah | 2614171X | Fakultas Syari'ah Institut Agama Islam Negeri Raden Intan, Lampung | Reakreditasi tetap di peringkat 2 mulai volume 15,nomor 2, tahun 2018 |
| | 4 | Al-A'raf : Jurnal Pemikiran Islam dan Filsafat | 25275119 | Fakultas Ushuluddin dan Dakwah (FUD) IAIN Surakarta | Reakreditasi naik peringkat dari peringkat 3 ke 2 Mulai Volume 15, nomor 2, tahun 2018 |
| | 5 | Al-Qalam | 2540895X | Balai Penelitian dan Pengembangan Agama Makassar | Reakreditasi tetap di peringkat 2 mulai volume 24, nomor 2, tahun 2018 |
| | 6 | Amerta Nutrition | 25801163 | Universitas Airlangga | Usulan baru mulai volume 1, nomor 1, tahun 2017 |
| | 7 | ASEAN Journal of Community Engagement | 25809563 | Directorate of Research and Community Engagement Universitas Indonesia | Usulan baru mulai volume 1, nomor 1, tahun 2017 |

| | | | | | |
|---|---|---|---|---|---|
| | 73 | Warta IHP (Industri Hasil Pertanian) | 26544075 | Balai Besar Industri Agro | Reakreditasi tetap di peringkat 2 mulai volume 35, nomor 2 tahun 2018 |
| | 74 | Warta Penelitian Perhubungan | 25801082 | Sekretariat Badan Penelitian dan Pengembangan Perhubungan | Reakreditasi naik peringkat dari 3 ke 2 mulai volume 30, nomor 2 tahun 2018 |
| 3 | 1 | AGROSAINSTEK: Jurnal Ilmu dan Teknologi Pertanian | 2579843X | Universitas Bangka Belitung Press | Usulan baru mulai volume 1, nomor 1, tahun 2017 |
| | 2 | Al Amwal: Jurnal Ekonomi dan Perbankan Syari'ah | 25273876 | Jurusan Perbankan Syari'ah Fakultas Syari'ah dan Ekonomi Islam IAIN Syekh Nurjati Cirebon | Usulan baru mulai volume 9, nomor 1, tahun 2017 |
| | 3 | Al Ibtida: Jurnal Pendidikan Guru MI | 25277227 | Jurusan PGMI Fakultas Ilmu Tarbiyah dan Keguruan IAIN Syekh Nurjati Cirebon dan Perkumpulan Dosen PGMI Indonesia | Reakreditasi naik peringkat dari 4 Ke 3 mulai Volume 5 Nomor 2 tahun 2018 |
| | 4 | AL QUDS : Jurnal Studi Alquran dan Hadis | 25803190 | Sekolah Tinggi Agama Islam Negeri (STAIN) Curup | Reakreditasi naik peringkat dari 4 ke 3 mulai Volume 2 nomor 2 tahun 2018 |
| | 5 | Al-Tadzkiyyah: Jurnal Pendidikan Islam | 25282476 | Jurusan Pendidikan Agama Islam Fakultas Tarbiyah dan keguruan Universitas Islam Negeri Raden Intan Lampung | Reakreditasi naik peringkat dari peringkat 4 ke 3 mulai Volume 9 nomor 2 tahun 2018 |
| | 6 | Arabiyatuna : Jurnal Bahasa Arab | 25805053 | Sekolah Tinggi Agama Islam (STAIN) Curup | Usulan baru mulai volume 1, nomor 1, tahun 2017 |

| | | | | | |
|---|---|---|---|---|---|
| | 41 | JMMR (Jurnal Medicoeticolegal dan Manajemen Rumah Sakit) | 25416715 | Program Magister Manajemen Rumah Sakit Univ. Muhammadiyah Yogyakarta | Usulan baru mulai volume 6, nomor 1, tahun 2017 |
| | 42 | Journal of Applied Agricultural Science and Technology | 26212528 | Politeknik Pertanian Negeri Payakumbuh | Usulan baru mulai volume 1, nomor 1, tahun 2017 |
| | 43 | Journal of Earth Energy Engineering | 25409352 | UIR Press, Universitas Islam Riau | Reakreditasi naik peringkat dari 5 ke 3 mulai volume 7, nomor 2, Tahun 2018 |
| | 44 | Journal of Educational Science and Technology | 24773840 | Program Pascasarjana Universitas Negeri Makassar | Reakreditasi tetap di perinkat 3 mulai volume 4, nomor 3, tahun 2018 |
| | 45 | Journal of ELT Research : The Academic Journal of Studies in English Language Teaching and Learning | 25277448 | Program Studi Pendidikan Bahasa Inggris, Sekolah Pasca Sarjana, Univ. Muhammadiyah Prof. DR. HAMKA | Reakreditasi naik peringkat dari peringkat 4 ke 3 mulai volume 4, nomor 1, tahun 2019 |
| | 46 | Journal of Fisheries and Marine Research | 25810294 | Fakultas Perikanan dan Ilmu Kelautan, Universitas Brawijaya Malang | Usulan baru mulai volume 1, nomor 1, tahun 2017 |
| | 47 | Journal of Governance and Public Policy | 25497669 | Magister Ilmu Pemerintahan, Universitas Muhammadiyah Yogyakarta (MIP-UMY) | Reakreditasi naik peringkat dari 5 ke 3, mulai dari volume 5, nomor 3, tahun 2018 |
| | 48 | Journal of Industrial Engineering Management | 25413090 | Fakultas Teknologi Industri - Universitas Muslim Indonesia | Usulan baru mulai volume 2, nomor 1, tahun 2017 |
| | 49 | Journal of Medives : Journal of Mathematics Education IKIP Veteran Semarang | 25495070 | Universitas IVET | Reakreditasi naik peringkat dari 4 ke 3, mulai dari volume 3, nomor 1, tahun 2019 |

| | | | | | |
|---|---|---|---|---|---|
| | 3 | BIOMA : Jurnal Biologi Makassar | 25486659 | Departemen Biologi, FMIPA UNHAS | Usulan baru mulai dari volume 3, nomor 2, tahun 2018 |
| | 4 | Journal DaFIna - Journal Deutsch als Fremdsprache in Indonesien | 25481681 | Jurusan Sastra Jerman Universitas Negeri Malang | Usulan baru mulai volume 1, nomor 1, tahun 2017 |
| | 5 | The Management Journal of Binaniaga | 2580149X | Centre for Research and Commubity Services STIE Binaniaga | Usulan baru mulai volume 2, nomor 1, tahun 2017 |
| | 6 | UIR Law Review | 2548768X | UIR Press, Universitas Islam Riau | Usulan baru mulai volume 1, nomor 1, tahun 2017 |

Ditetapkan di Jakarta
pada tanggal 4 April 2019

DIREKTUR JENDERAL
PENGUATAN RISET DAN PENGEMBANGAN,

TTD.

MUHAMMAD DIMYATI
NIP 195912171984041001

Salinan sesuai dengan aslinya,
Direktorat Jenderal Penguatan Riset dan Pengembangan
Kementerian Riset, Teknologi, dan Pendidikan Tinggi
Kepala Bagian Hukum, Kerjasama, dan Layanan Informasi,

Syarip Hidayat
NIP 197306101997031004

pISSN: 2301-8097 eISSN: 2540-9352

# Journal of Earth Energy Engineering

Accredited by Directorate General of Strengthening for Research and Development, Ministry of Research, Technology, and Higher Education of Republic Indonesia No: 10/E/KPT/2019

VOL. 12 NO. 2, OCTOBER 2023

**PUBLISHER**

Universitas Islam Riau (UIR) Press



## SCOPE OF JOURNAL

This journal aims to promote excellence in the fields of earth science and energy. The journal welcomes contribution in such areas of current analysis particularly in fossil energy exploration, extraction, and processing. The priority areas include enhanced oil recovery, reservoir engineering, formation

pISSN: 2301-8097 eISSN: 2540-9352

# Journal of Earth Energy Engineering

Accredited by Directorate General of Strengthening for Research and Development, Ministry of Research, Technology, and Higher Education of Republic Indonesia No: 10/E/KPT/2019

evaluation, production technique, drilling and drilling fluids, petroleum geology, and petroleum economics. This journal also publishes original works, from fundamental principles to practical applications in the field of energy utilization, energy conservation, and sustainable energy.

This journal accepts articles on any earth and energy-related subjects and any research methodology that meet the standards established for publication in the journal. The primary criterion for publication in Journal of Earth Energy Engineering is the significance of the contribution an article makes to the literature in earth and energy research area, i.e., the significance of the contribution and on the rigor of analysis and presentation of the paper. The acceptance decision is made based upon an independent review process that provides critically constructive and prompt evaluations of submitted manuscripts.

## ABOUT THE JOURNAL

Journal of Earth Energy Engineering (pISSN 2301-8097, eISSN 2540-9352) is the leading primary research journal in the fields of earth science and energy with a particular focus on fossil energy exploration, extraction, and processing. Journal of Earth Energy Engineering is published by Universitas Islam Riau (UIR) Press, three times a year, every March, July, and November. From its launch in 2012 to the present day, Journal of Earth Energy Engineering publishes papers on every aspect of fossil energy-based, from the start of the extraction process in drilling and completion technology, reservoir studies, and new method of recovery to the various production technique (see Focus and scope). Our authors and readers reflect a broad interdisciplinary group of scientists who study fossil energy exploration, extraction, and processing.

All research articles published in Journal of Earth Energy Engineering are subject to rigorous double-blind peer review, and editorial decisions are made by a team of expert researchers in the field, supported by an International Editorial Board. Journal of Earth Energy Engineering is indexed in Directory of Open Access Journal (DOAJ), Google Scholar, Science and Technology Index (SINTA S3), Indonesian Publication Index (IPI), and BASE, and has been ACCREDITED by Ministry of Research, Technology, and Higher Education of the Republic of Indonesia, No.10/E/KPT/2019, April 4, 2019 as 3rd Rank, SINTA S3.

## EDITORIAL OFFICE OF JOURNAL OF EARTH ENERGY ENGINEERING

“A” Building Faculty of Engineering, Universitas Islam Riau.
Jalan Kaharuddin Nasution No. 113 Pekanbaru, Riau 28284, Indonesia
Email: jeee@journal.uir.ac.id
Website: https://journal.uir.ac.id/index.php/jeee

pISSN: 2301-8097 eISSN: 2540-9352 Vol. 12 No. 2, October 2023

# Journal of Earth Energy Engineering

Accredited by Directorate General of Strengthening for Research and Development, Ministry of Research, Technology, and Higher Education of Republic Indonesia No: 10/E/KPT/2019

## LIST OF CONTENT

**Available online: http://journal.uir.ac.id/index.php/JEEE/index**

**Journal of Earth Energy Engineering**

**Publisher: Universitas Islam Riau (UIR) Press**

# Comparative Study of Economic Evaluation of PSC Cost Recovery and PSC Gross Split Scheme for Expiry Block, Case Study Field A in Sumatera

Prayang Sunny Yulia[1*], Adji Nadzif Sidqi[1], Syamsul Irham[1], Mustamina Maulani[1], Puri Wijayanti[1]
[1]Department of Petroleum Engineering, Faculty of Earth Technology and Energy, Universitas Trisakti, Jalan Kyai Tapa nomor 1, Grogol, Jakarta Barat -11450, Indonesia
*Corresponding Author: prayang@trisakti.ac.id

**Article History:**

Received: May 1, 2023
Receive in Revised Form: August 14, 2023
Accepted: September 11, 2023

**Keywords**:

Production Sharing Contract, Gross Split, Cost Recovery, Petroleum Economics, Investment

**Abstract**

In August 2021, there was an alteration in the production-sharing contract for Field A, which is located at Rokan Block, Riau Province. In Field A, the methods that were applied were waterflood and artificial lift by using an Electrical Submersible Pump (ESP). This block is an expiry block, whereas a new block is due to contract expiry from the previous contractor. The contract previously used was a Production Sharing Contract (PSC) Cost Recovery, which changed to PSC Gross Split. This contract comparison aims to synergistically evaluate the comparison of the two economic models and also to determine a more efficient and appropriate scheme to be applied to field A, as well as to analyze the parameters that can affect the economic indicators of field A. The results of the economic analysis that has been carried out show that the PSC Gross Split scheme is better than the PSC Cost Recovery scheme. The NPV of the PSC Gross Split scheme for 30 wells was $37,903,000, and the PSC Cost Recovery scheme for 30 wells was $13,850,000. From 30 wells, the result decided on the A6 Well, which the NPV of A6 Well has the best NPV for both schemes based on the contractor's point of view, $494,000 for the PSC Cost Recovery, and $ 1,380,000 for the PSC Gross Split. The Pay Out Time (POT) is derived as well from A6 Well for both schemes, which is 1.39 years for PSC Cost Recovery and 1.2 years for PSC Gross Split. The Interest Rate of Return (IRR) of PSC Cost Recovery is 146% on the A19 Well, and for PSC Gross Split is 408% on the A4 Well. The sensitivity analysis that has been carried out shows that the parameters of the amount of oil production and the price of oil have a significant effect on both schemes.

## INTRODUCTION

There are two types of production-sharing contracts in the oil and gas industry, namely PSC Cost Recovery and PSC Gross Split. PSC Cost Recovery, namely the return of operating costs in the amount incurred by the contractor (Ariyon et al., 2020). Meanwhile, PSC Gross Split, components from PSC Cost Recovery such as Equity to be Split (ETS) and First Tranche Petroleum (FTP) are eliminated, and contractors who use the PSC Gross Split will receive a larger additional split, especially if the work area has higher risk and more complicated and challenging operation activities (Adityawarman et al., 2020). Based on the work system, PSC can be analogized and also illustrated by the existence of a work contract, namely between the state as the owner and holder of natural resources, and the contractor who has the role of investor (Afiati et al., 2020).

In this case, the contractor in carrying out and carrying out its activities will receive compensation in the form of production from oil and gas fields. If it produces, then there is a distribution of income that will be received by the executor and the state party, and also based on the principle of consensual in an agreement. This research was conducted to find out which contract scheme is profitable for a field by using the data owned and assumed (Sidqi et al., 2022).

DOI: 10.25299/jeee.2023.12530
eISSN: 2540-9352 pISSN: 2301-8097

This research is located in the Rokan Block, Riau Province. In the working area, 30 wells from field A will be analysed. This field uses the PSC Gross Split scheme, which previously used the PSC Cost Recovery scheme. The new contract in this Working Area starts from 2021 to 2041. The purpose of this change in the scheme is so that oil and gas exploration and exploitation activities can be more effective and efficient. The government also does not need to bear the burden, because the investment and operational costs are fully borne by the contractor in the PSC Gross Split scheme (Daniel, 2017). With this change in the contract scheme, something should be done by the contractor to attain a good result of economic feasibility (Irham et al., 2018).

## METHOD

This research was conducted to find out and evaluate the economic results of the two schemes. The collection of data is by secondary data. The comparison of PSC Cost Recovery and Gross Split schemes can be seen as the following Figure 1.

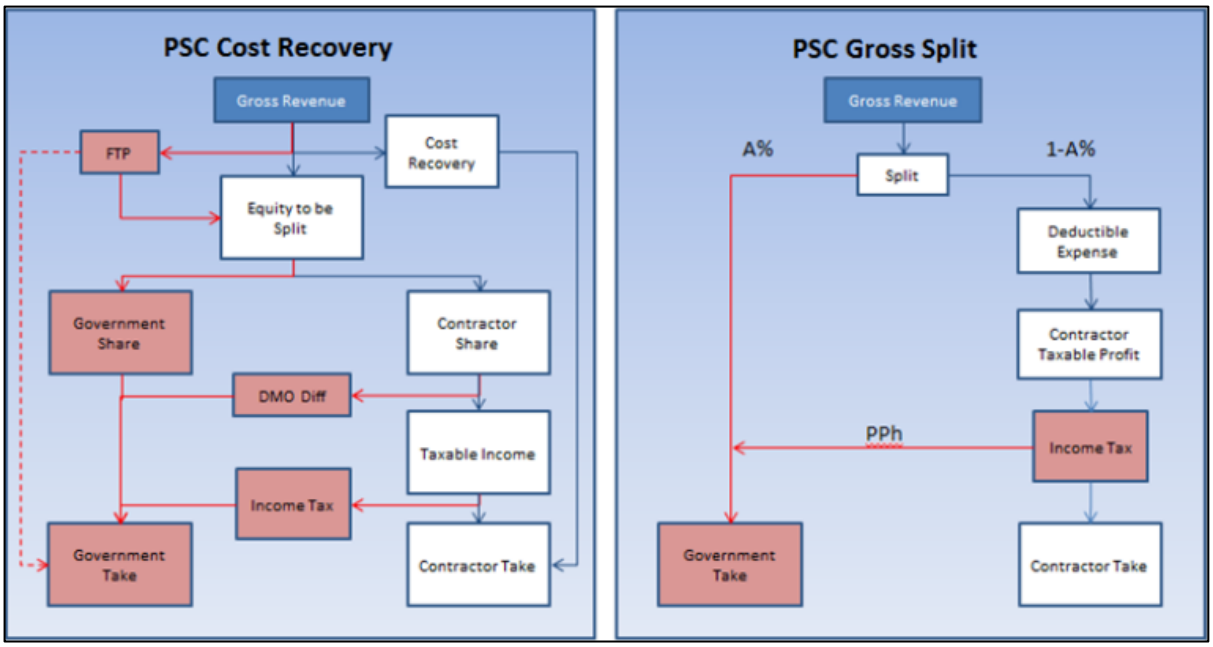



Figure 1. Comparison of PSC Cost Recovery and Gross Split schemes (Anjani & Baihaqi, 2018)

The most significant difference between the two schemes is the presence and absence of cost recovery, and the government is no longer burdened with cost recovery from the oil and gas development (Anjani & Baihaqi, 2018).

In PSC Cost Recovery, the Indonesian government and contractor have the authority to seize 20% of gross income prior to the cost recovery process (Kesumaputri & Irham, 2016). This is referred to as first tranche petroleum (FTP). Unlike royalty, the proportion of FTP is split between the government and the contractor. The percentages for the government and contractor in terms of oil share are 71.1538% and 28.8462%, respectively (Giranza & Bergmann, 2018). In the PSC Cost Recovery scheme, State Revenue Tax uses the assume and discharge principle, where the calculation of the state's share and the contractor's share already includes a tax component, therefore the contractor is not charged any other additional taxes and is not a component of CAPEX and OPEX. PSC Cost recovery is the return of costs incurred by the contractor for exploration, development, and operating costs beyond gross income. Most production-sharing contracts have limits on the amount of contractor income recognized to get a refund but not all costs can be requested for repayment, such as last year's funding, and refunded in the event year. The limitation of cost recovery or the limit of the refund limit as commonly known ranges from 30% - 60%. Generally, there are cost controllable costs in administering administration, while uncontrollable costs include efforts to find additional reserves through exploration and development activities and the addition of production facilities (Arifin & Hidayat, 2021).

The PSC Gross Split, does not have a cost recovery mechanism; therefore, PSC contractor income comes solely from its gross production sources and also has to pay income tax to the government in connection with this income (Irham & Julyus, 2018). Government revenue will consist of the government's gross share of production, bonuses, PSC contractors' income taxes, and indirect taxes paid by PSC Contractors. According to the Regulation of the Minister of Energy and Mineral Resources of Indonesia No. 52 of 2017, the basic division for PSC Contractors is 43% for oil and 48% for gas (Ariyon et al., 2020). The oil split can

**Journal of Earth Energy Engineering**
Vol. 12 No. 2, October 2023, pp 85-95

be increased or decreased through variable split and progressive split, according to Minister Regulation No. 08/2017 on Indonesian PSC Gross Split (Pramadika & Satiyawira, 2019). The variable split is an oil split modification depending on field factors such as field status, field location, block status, reservoir depth, reservoir type, supporting infrastructure availability, carbon dioxide concentration, and domestic component level. This split will also be altered based on progressive criteria such as oil price, cumulative oil and gas output, and economic levels (Giranza & Bergmann, 2018).

Referring to Figure 2 below, the data referred to the whole of oil production data, Capital Expenditure (CAPEX) and Operating Expenditure (OPEX) costs, oil prices, and also contract policies. The data is used to calculate the economy, and also for sensitivity analysis using the economic parameters that have been obtained. The figure below shows the steps of the research as depicted on flowchart as follows.

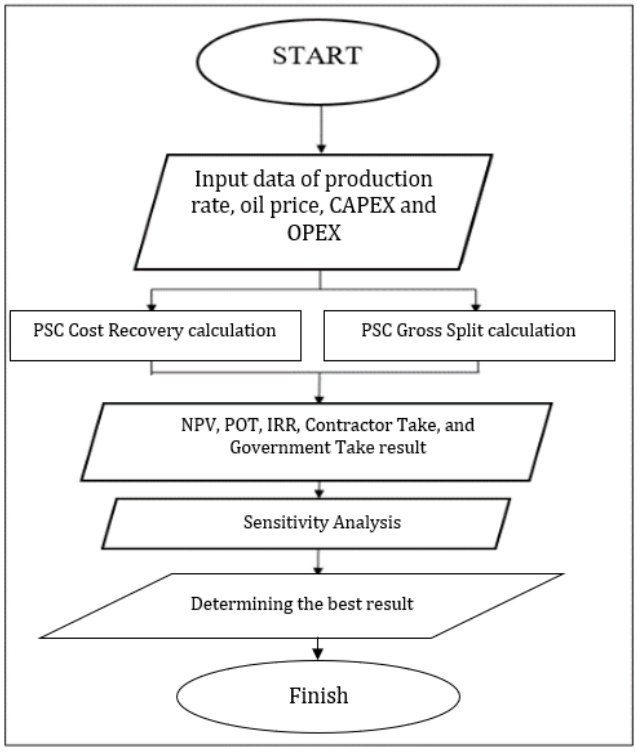



Figure 2. Research Workflow

Based on the flowchart above, the first step taken for this research was to enter production rates, oil prices, and expenditures (CAPEX and OPEX). Furthermore, the following step was with the available fiscal terms, the economic calculation is carried out using the PSC Cost Recovery and PSC Gross Split schemes. After obtaining the economic results from the PSC Cost Recovery and PSC Gross Split schemes, economic indicators (NPV, IRR, POT, Contractor Take, and Government Take) are calculated. Moreover, the next step was analysing the sensitivity of economic indicators. The final step was determining which scheme is the most appropriate and optimal for this field.

**RESULT AND DISCUSSION**

This field was only managed oil. Before calculating, data input is done first, such as production data, oil prices, CAPEX, and OPEX. The oil price at that period was $69 and the average oil production was 135,000 barrels. From the data that has been obtained, then calculations are carried out for both schemes. Gross Revenue earned was $9,281,000.

Table 1. Expenditures Per Well for Field A

| Expenditures | Total ($) |
|---|---|
| CAPEX | 1,136,000 |
| OPEX | 1,436,000 |

The table above (Table 1), CAPEX is divided into two classifications; tangible and intangible costs. Tangible costs are the costs of basic materials, sort of casing, tubing, wellheads, casing accessories, and well equipment subsurface. In addition, intangible costs are service costs, sort of rig rental, well service,

completion, general, and other production facilities. Meanwhile, OPEX is a cost incurred by a company for operation and maintenance.

Table 2. Fiscal Terms Contract Scheme PSC Cost Recovery

| Indicator | PSC Cost Recovery |
|---|---|
| FTP | 20% |
| Government Share (after tax) | 85% |
| Contractor Share (after tax) | 15% |
| Tax | 40.5% |
| DMO Volume | 25% |
| DMO fee (market price) | 15% |
| Depreciation rate | 25% |
| Depreciation life | 5 years |

In table 2, there are fiscal terms for the PSC Cost Recovery scheme, these terms are used when the work area still has a contract with the previous contractor and the contract ends in August 2021. The FTP distribution for the government and contractors is 20% of gross revenue, the contractor also submits a Domestic Market Obligation (DMO) of 25% of the total production obtained. Contract depreciation is 25% for 5 years, the depreciation method used is decline balance.

In the PSC Gross Split scheme, the split between the contractor and the government is divided into three, namely a base split, a variable split, and a progressive split. This refers to the Regulation of the Minister of Energy and Mineral Resources no. 52 of 2017. The base split for contractors is 43% and for the government 57%. After the base split, the next determination is the variable split, the comparison between standard classification and Field A (as the part of expiry block), as shown on Table 3 as below.

Table 3. Variable Split

| Parameter | Condition | Split Adjustment | Condition | Split Adjustment |
|---|---|---|---|---|
| | Standard | | Field A | |
| Field Status | POD I | 5% | No POD | 0% |
| | POD II | 3% | | |
| | No POD | 0% | | |
| Field Location | Onshore | 0% | Onshore | 0% |
| | Offshore (0<h≤20 m) | 8% | | |
| | Offshore (150<h≤1000 m) | 14% | | |
| | Offshore (>1000 m) | 16% | | |
| Reservoir Depth | <2500 m | 0% | <2500 m | 0% |
| | >2500 m | 1% | | |

Table 3. Variable Split (extended)

**Journal of Earth Energy Engineering**
Vol. 12 No. 2, October 2023, pp 85-95

| Parameter | Condition | Split Adjustment | Condition | Split Adjustment |
|---|---|---|---|---|
| | Standard | | Field A | |
| Infrastructure | Well Developed | 0% | Well Developed | 0% |
| | New Frontier Offshore | 2% | | |
| | New Frontier Onshore | 4% | | |
| Reservoir Condition | Conventional | 0% | Conventional | 0% |
| | Non-Conventional | 16% | | |
| $CO_2$ (%mol) | <5% | 0% | <5% | 0% |
| | 5%≤x≤10% | 0.5% | | |
| | 40%≤x≤60% | 2% | | |
| | x≥60% | 4% | | |
| $H_2S$ (ppmV) | <100 | 0% | <100 | 0% |
| | 100≤x<1000 | 1% | | |
| | 1000≤x<2000 | 2% | | |
| | 2000≤x<3000 | 3% | | |
| | 3000≤x<4000 | 4% | | |
| | x≥4000 | 5% | | |
| Specific Gravity Oil | API<25 | 1% | API>25 | 0% |
| | API≥25 | 0% | | |
| Local Content (%) | 30%≤X≤50% | 2% | 50%<x<70% | 3% |
| | 50%≤x≤70% | 3% | | |
| | 70%≤x<100 | 4% | | |
| Production Phase | Primary | 0% | Secondary | 6% |
| | Secondary | 6% | | |
| | Tertiary | 10% | | |

After the variable split is determined, the next step is to determine the progressive split based on the cumulative annual oil production and oil prices.

Table 4. Progressive Split

| Parameter | Condition | Split Adjustment |
|---|---|---|
| Oil Price | (85-ICP) x 2.5% | 3.75% |
| Cumulative Production | >30 MMBOE | 0% |

This working area split adjustment is 3.75%. Because of Cumulative Production was more than > 30 MMBOE in 2022, the split adjustment is 0% based on the Table 4 above.

Furthermore, Figure 3 below shows the economic results based on NPV of 30 wells from Field A with the PSC Cost Recovery and PSC Gross Split contract scheme. The NPV of the PSC Cost Recovery scheme contractor from A6 Well is $494,000. Meanwhile, the NPV of the PSC Gross Split scheme contractor from A6 Well is $1,380,000. Both from two PSC schemes, A6 Well has the highest NPV compared to other wells, therefore A6 Well is the well with the best prospects.

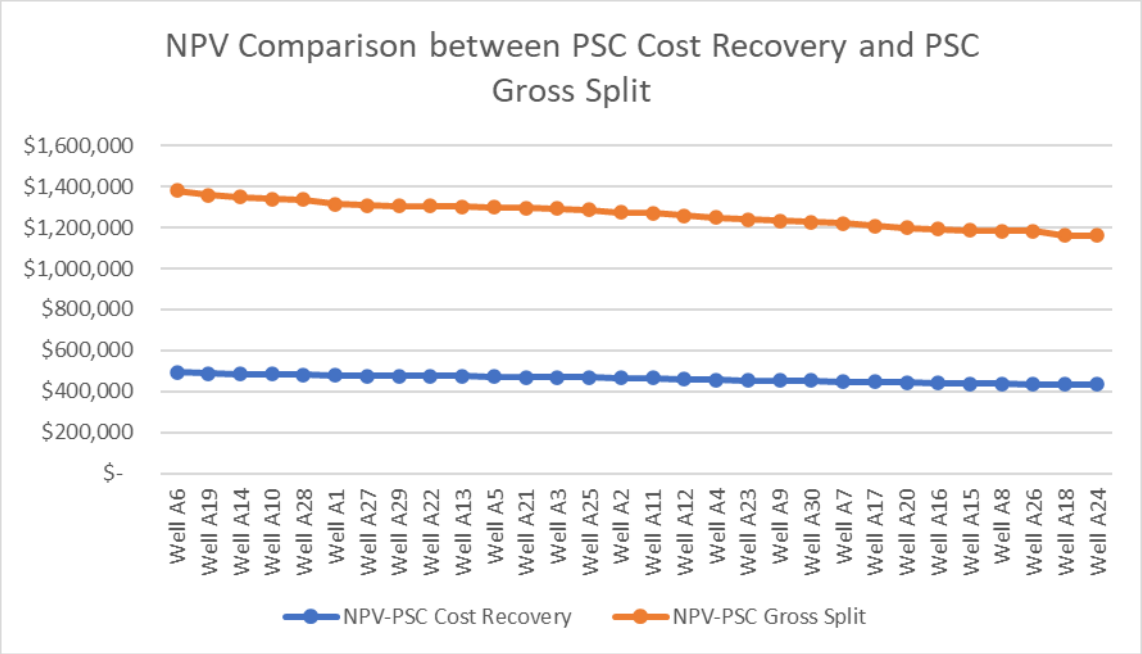



Figure 3. NPV Comparison between PSC Cost Recovery and PSC Gross Split

After the comparison of NPV, Figure 4 below will be shown the comparison of the POT between both schemes, PSC Cost Recovery and Gross Split. The graphic of POT is shown in a year and conversely, the shortest its year, the most profitable the project will be. The graphic can be seen as follows:

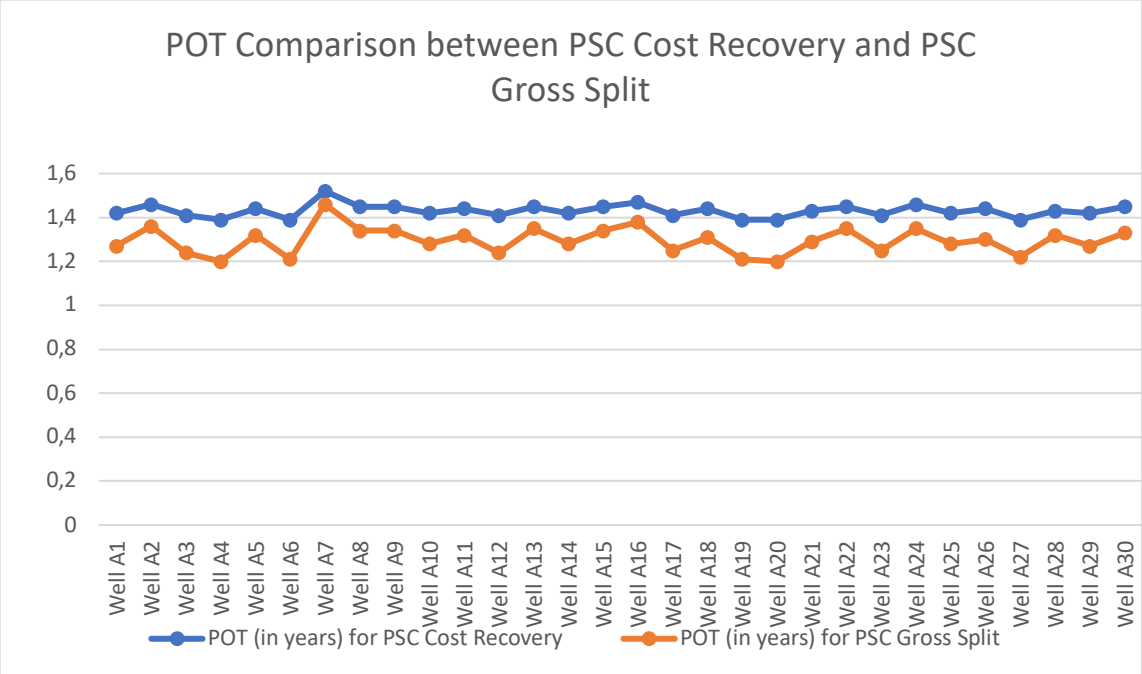



Figure 4. POT Comparison between PSC Cost Recovery and PSC Gross Split

According to the Figure 4 above, the shortest POT for PSC Cost Recovery scheme is Well A4, A6 and A27 with 1.39 years. Meanwhile, the POT for PSC Gross Split scheme is Well A4 with 1.2 years. As the result, the shortest year of them all is Well 4 for PSC Gross Split scheme, with 1.2 years.

After determining the POT, the following Figure 5 will be shown another indicator the IRR, which has been compared between PSC Cost Recovery and Gross Split. Conversely, the decent IRR amount is above the MARR (Minimum Attractive Rate of Return), which for this company, the MARR is 10%. The figure can be seen as follows:

**Journal of Earth Energy Engineering**
Vol. 12 No. 2, October 2023, pp 85-95

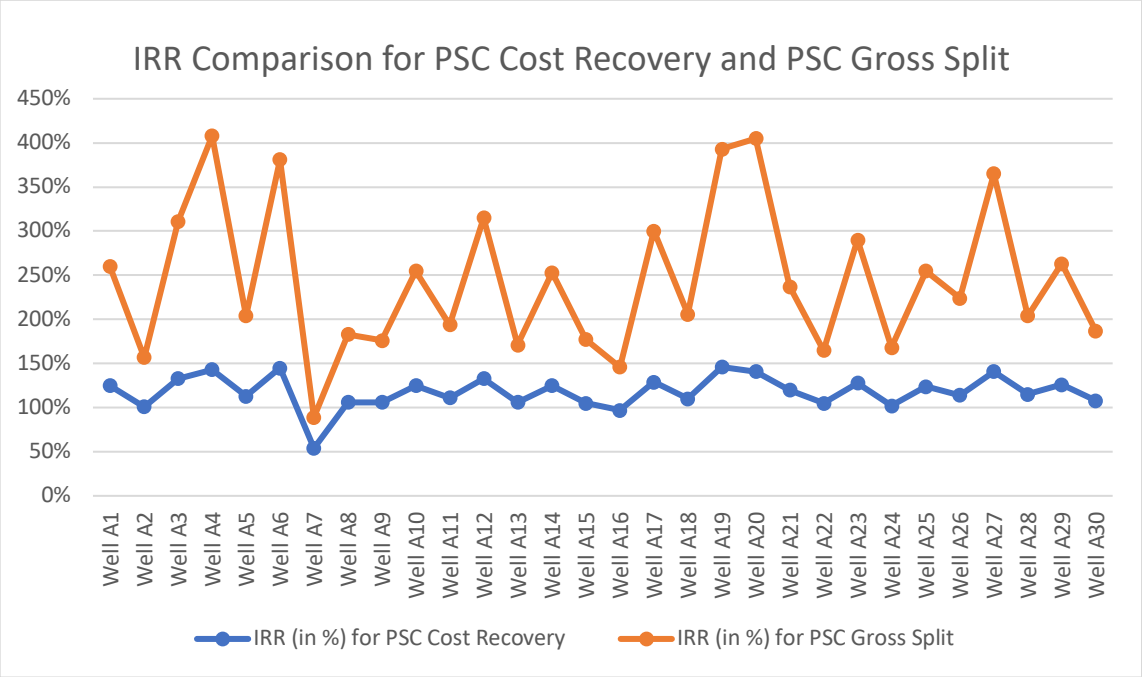



Figure 5. IRR Comparison between PSC Cost Recovery and PSC Gross Split

As the result above, the highest IRR for PSC Cost Recovery is 146% on Well A19, meanwhile, the highest IRR for PSC Gross Split is 408% on Well A4. Collecting from the highest results, it can be determined that the first place goes to, Well A4 PSC Gross Split scheme.

The following indicator is Contractor Take, which is to indicate the total share owned by the contractor, after the tax deduction for the government. The comparison graph can be seen at Figure 6 as follows:

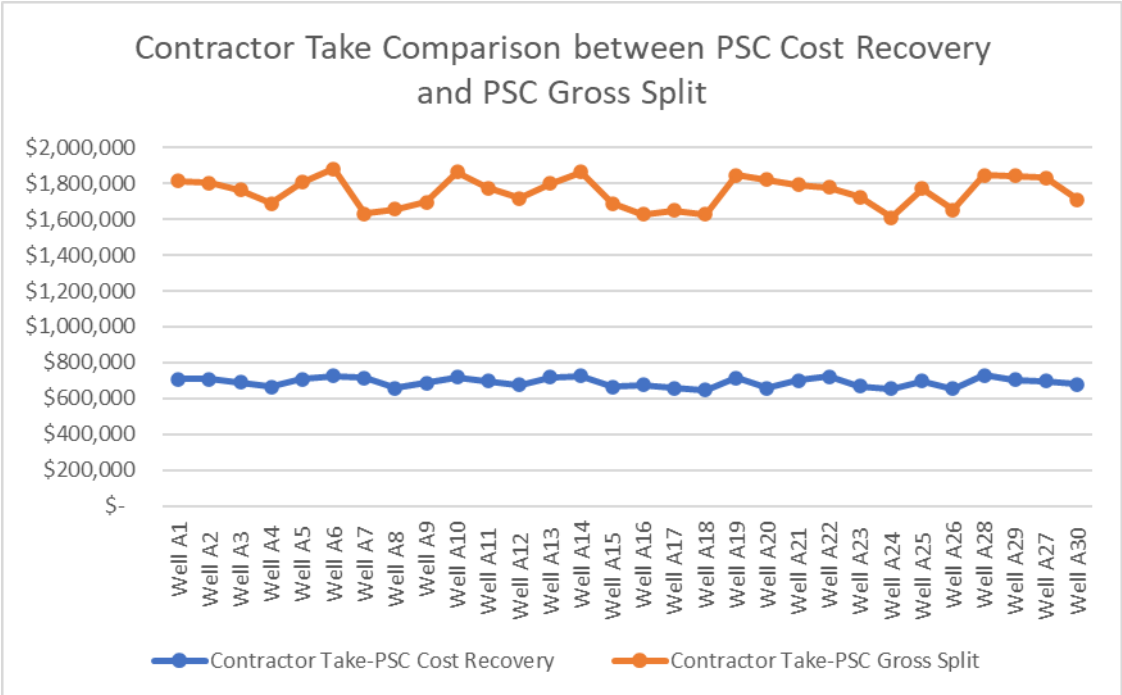



Figure 6. Contractor Take Comparison between PSC Cost Recovery and PSC Gross Split

Referring to Figure 6, the highest amount Contractor Takes for PSC Cost Recovery is $ 728,000 on Well A28. On the other hand, for PSC Gross Split is $ 1,879,000 on Well A6. As same as the previous indicators, the greatest amount is still at PSC Gross Split.

The last indicator to be compared in this research is Government Take as the portion received by the government, as well as added taxes from the contractor. The graph can be seen in Figure 7 as follows:

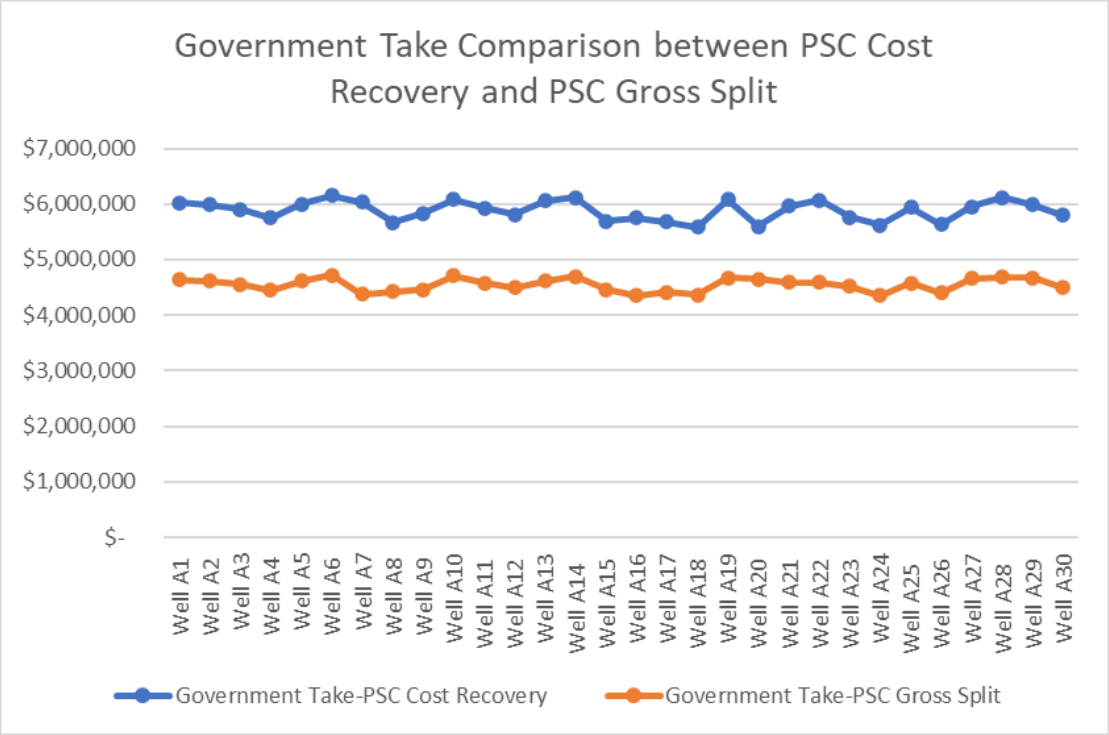



Figure 7. Government Take Comparison between PSC Cost Recovery and PSC Gross Split

Based on Figure 7, it can be determined that the highest amount of Government Take for PSC Cost Recovery is $ 6,154,000 on Well A6, then for PSC Gross Split is $ 4,721,000 on Well A6. Both wells showed the highest amount of Government Take, however, the highest amount was taken by the PSC Cost Recovery.

As the result of the indicators that has been compared, the highest results from both schemes are shown in Table 5 as follows:

Table 5. Calculation Results of the Best PSC Cost Recovery and Gross Split

| Indicator | Well (CR & GS) | Cost Recovery | Gross Split |
|---|---|---|---|
| NPV | A6 & A6 | $ 494,000 | $ 1,380,000 |
| POT | A6 & A6 | 1.39 year | 1.2 year |
| IRR | A19 & A4 | 146% | 408% |
| Contractor Take ($) | A28 & A6 | $ 728,000 | $ 1,879,000 |
| Government Take ($) | A6 & A6 | $ 6,154,000 | $ 4,721,000 |

The table above (Table 5) shows the best well results from the indicators of the two schemes. These results indicate which well to drill first, according to the NPV results. This is because the drilling is done based on the highest economic results.

The following figure (Figure 8), there will be shown about four parameters are carried out for sensitivity analysis: oil production, CAPEX, OPEX, and oil prices. In this scheme, oil production and oil prices are very sensitive and affect the NPV, this can happen because, if the sensitivity percentage is increased or decreased, there will be a significant increase or decrease. Some parameters are analysed for sensitivity, the same as PSC Cost Recovery. Even in the PSC Gross Split scheme, the amount of oil production and oil prices are very sensitive to the NPV, but in this scheme, oil production changes more significantly than oil prices. The well used is well A6, which is well with the best NPV of the other wells. The well has been analyzed for sensitivity and shows that the amount of oil production and the price of oil in the PSC Cost Recovery scheme are very influential and sensitive to NPV, this is because if the percentage of sensitivity when the amount of oil production and the price of oil are reduced, a very significant decrease occurs, and if the sensitivity of the amount of oil production and the price of oil is increased, a very significant increase occurs.

**Journal of Earth Energy Engineering**
Vol. 12 No. 2, October 2023, pp 85-95

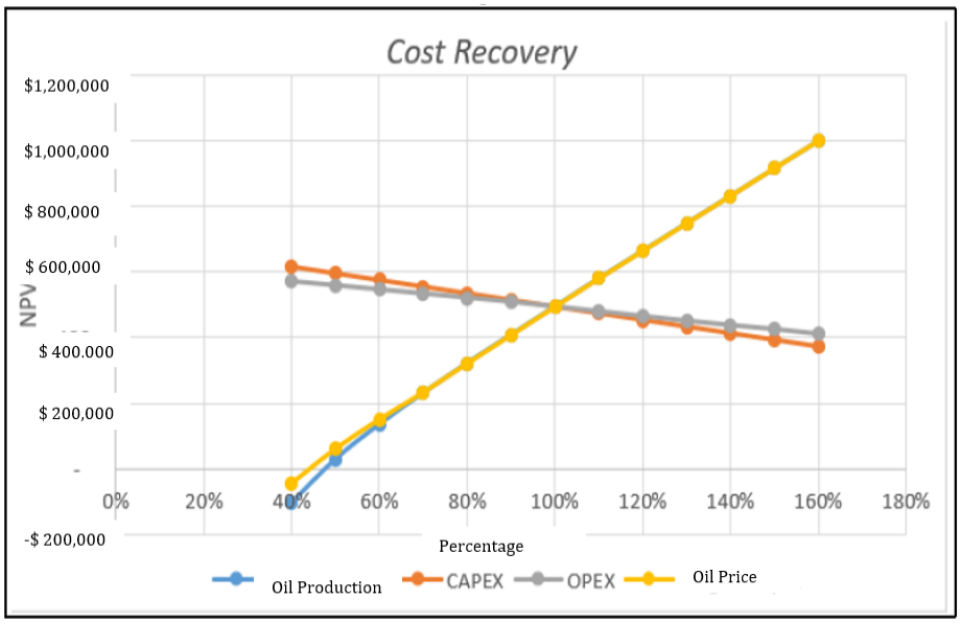



Figure 8. NPV Sensitivity Analysis on Best Well for PSC Cost Recovery

In Figure 9 below, some parameters are analysed for sensitivity, as same as PSC Cost Recovery. Even in the PSC Gross Split scheme, the amount of oil production and oil prices are very sensitive to the NPV, but in this scheme, oil production changes more significantly than oil prices. This is because if the sensitivity percentage of the amount of oil production and the price of oil is decreased or increased, there will be a very significant decrease and increase.

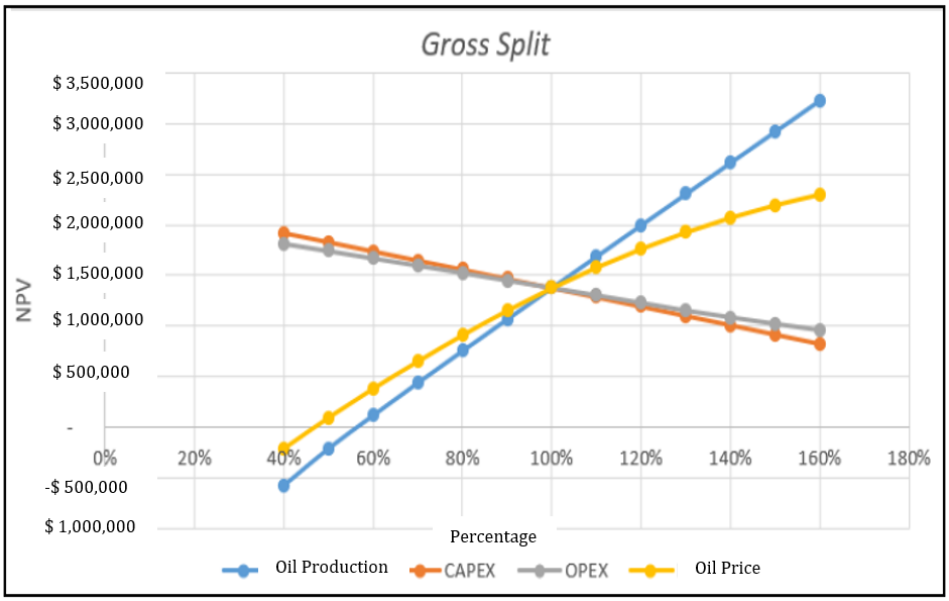



Figure 9. NPV Sensitivity Analysis on Best Well for PSC Gross Split

**DISCUSSION**

The PSC Gross Split produced better value than the PSC Cost Recovery scheme in terms of contractor income. The value of CAPEX and OPEX from the PSC Cost Recovery and PSC Gross Split schemes has differences, because in the PSC Gross Split scheme, state revenue tax is the full responsibility of the contractor, and OPEX is included in state revenue tax in this scheme.

The NPV of the PSC Gross Split scheme for 30 wells was $ 37,903,000; and the PSC Cost Recovery scheme for 30 wells was $ 13,850,000. Therefore, the NPV of the PSC Gross Split is greater than the PSC Cost Recovery in the 30 wells in Field A based on the point of view contractor.

After that, from 30 wells, the result decided on the A6 Well, which the NPV of A6 Well has the best NPV for both schemes based on the contractor's point of view, which is $ 494,000 for the PSC Cost Recovery, and $ 1,380,000 for the PSC Gross Split. The best period of POT derived from A6 Well for both schemes, which is

1.39 years for PSC Cost Recovery and 1.2 years for PSC Gross Split. The percentage of IRR has been determined on its greatest amount for both schemes that derived from A19 Well for PSC Cost Recovery in 146% and A4 Well for PSC Gross Split in 408%.

The contractor take for 30 wells in Field A with the PSC Gross Split scheme was higher than the PSC Cost Recovery. The contractor takes from PSC Gross Split amounted to $52,544,000; while Contractor takes from PSC Cost Recovery amounted to $20,741,000.

The government take from 30 wells in Field A with the PSC Cost Recovery scheme is higher than the Gross Split PSC. The government take for the PSC Cost Recovery scheme was $176,588,000, and for the Gross Split PSC scheme was $136,400,000.

## CONCLUSION

According to the research that has been done and the discussion that has been described, it can be concluded that the NPV of the Gross Split PSC scheme for 30 wells is greater than the PSC Cost Recovery. A6 Well is well with the best NPV in both contract schemes. The Contractor Takes 30 wells with PSC Gross Split greater than PSC Cost Recovery. Meanwhile, for the Government Take 30 wells, the PSC Cost Recovery scheme is larger than the Gross Split PSC.

Based on the sensitivity analysis that has been carried out by increasing and decreasing the value of the economic parameter by approximately 60% of the original value, it can be concluded that the higher the percentage value of the total production and oil price, the better the NPV. However, for CAPEX and OPEX, it will be better if the percentage value is lower.

The advice that can be given is, contractors who use the Gross Split PSC contract scheme to be able to better maintain production levels but with the use of effective and efficient costs, this is because the increase in CAPEX and OPEX costs in the Gross Split PSC scheme is more sensitive to NPV compared to the PSC scheme Cost Recovery.

## ACKNOWLEDGEMENT

The author is grateful to be able to finish this article. It is hoped that this journal can provide benefits to all readers. The author is also very grateful to the Dean of the Faculty of Earth and Energy Technology (FTKE) Universitas Trisakti, the Director of Research and Community Service (LPPM) Universitas Trisakti, and field supervisors from Pertamina Hulu Rokan.

## REFERENCES

Adityawarman, A., Aziz, F. A., Aziz, P. A., Yusgiantoro, P., & Chandra, S. (2020). Economic Evaluation of Fiscal Regime on EOR Implementation in Indonesia: A Case Study of Low Salinity Water Injection on Field X. *Journal of Earth Energy Engineering*, *9*(1), 17–35. https://doi.org/10.25299/jeee.2020.4608

Afiati, N., Irham, S., & Pramadika, H. (2020). ANALISIS KEEKONOMIAN BLOK NSRN DENGAN MENGGUNAKAN PSC GROSS SPLIT DAN PENAMBAHAN DISKRESI. *Petro: Jurnal Ilmiah Teknik Perminyakan*, *9*(2).

Anjani, B. R., & Baihaqi, I. (2018). Comparative analysis of financial Production Sharing Contract (PSC) cost recovery with PSC gross split: Case study in one of the contractor SKK Migas. *Journal of Administrative and Business Studies*, *4*(2). https://doi.org/10.20474/jabs-4.2.2

Arifin, K., & Hidayat, D. (2021). COST RECOVERY ANALYSIS IN PRODUCTION SHARING CONTRACT IN UPSTREAM OIL AND GAS INDUSTRY (STUDY ON GAS UPSTREAM INDUSTRIES INDONESIA). *Dinasti International Journal of Economics, Finance and Accounting*, *1*(6). https://doi.org/10.38035/DIJEFA

Ariyon, M., Setiawan, A., & Reza, R. (2020). Economic Feasibility Study of Onshore Exploration Oil Field Development using Gross Split Contract. *IOP Conference Series: Materials Science and Engineering*, *847*(1). https://doi.org/10.1088/1757-899X/847/1/012030

Daniel, H. (2017, October 17). Indonesian Milestone in Production-Sharing Contract in Perspective of Government Take, Contractor Take, Cost Recovery and Production Target. *In SPE/IATMI Asia Pacific Oil & Gas Conference and Exhibition, Jakarta, Indonesia, Paper Number: SPE-187008-MS.* https://doi.org/10.2118/187008-MS

Giranza, M. J., & Bergmann, A. (2018). Indonesia's New Gross Split PSC: Is It More Superior Than the Previous Standard PSC? *Journal of Economics, Business and Management*, *6*(2).

Irham, S., & Julyus, P. (2018). The new energy management policy: Indonesian PSC-gross-split applied on steam flooding project. *IOP Conference Series: Earth and Environmental Science*, *106*, 012109. https://doi.org/10.1088/1755-1315/106/1/012109

**Journal of Earth Energy Engineering**
Vol. 12 No. 2, October 2023, pp 85-95

Irham, S., Sibuea, S. N., & Danu, A. (2018). The New Management Policy: Indonesian PSC-Gross Split Applied on CO2 Flooding Project. *IOP Conference Series: Earth and Environmental Science*, *106*(1). https://doi.org/https://doi.org/10.1088/1755-1315/106/1/

Kesumaputri, F. D., & Irham, S. (2016). Analisa Kelayakan Perpanjangan Kontrak Blok XO dengan Sistem Production Sharing Contract (PSC). *Seminar Nasional Cendekiawan 2015*, 379–386. https://doi.org/https://doi.org/10.25105/semnas.v0i0.256

Pramadika, H., & Satiyawira, B. (2019). PENGARUH HARGA GAS DAN KOMPONEN VARIABEL TERHADAP KEUNTUNGAN KONTRAKTOR PADA GROSS SPLIT. *PETRO:Jurnal Ilmiah Teknik Perminyakan*, *7*(3), 113–117. https://doi.org/10.25105/petro.v7i3.3817

Sidqi, A. N., Irham, S., & Yulia, P. S. (2022). Evaluasi Perbandingan Keekonomian 30 Sumur Skema PSC Cost Recovery dan Gross Split Lapangan A. *PETRO: Jurnal Ilmiah Teknik Perminyakan*, *11*(4), 191–195.

UNIVERSITAS TRISAKTI

Prayang Sunni <prayang@trisakti.ac.id>

# [JEEE] Editor Decision

7 messages

**Farizal Hakiki** <admin@journal.uir.ac.id> Mon, Sep 11, 2023 at 9:58 PM
To: Prayang Sunny Yulia <prayang@trisakti.ac.id>

Dear Prayang Sunny Yulia, Adji Nadzif Sidqi, Syamsul Irham, Mustamina Maulani, Puri Wijayanti:

I am pleased to tell you that your manuscript entitled "The Synergetic Economic Evaluation of PSC Cost Recovery and Gross Split Schemes on Field A" submitted into Journal of Earth Energy Engineering have been accepted. I am attaching a document with some basic required edits that need to be applied to your manuscript before it's published.

In order to proceed to publish your submission, we will need you to submit the A pdf signed author statement on the originality of the work [DOWNLOAD IN HERE]. Please send the signed document to jeee@journal.uir.ac.id.

At this time we also want to remind you of our copyright and open access policies, please see it at this link.

Once your manuscript is moved to the production stage, our production editor will keep you informed of your article's progress in the production process. You will also receive proof of your manuscript for final review.

We're excited to move forward with your submission. Please feel free to email me with any questions.

Editor

Farizal Hakiki Soemarsono, Ph.D
farizal.hakiki@kaust.edu.sa

Journal of Earth Energy Engineering

**2 attachments**

**C-Revision.docx**
1421K

**STATEMENT ON ORIGINALITY OF THE WORK.docx**
21K

**Prayang Sunni** <prayang@trisakti.ac.id> Tue, Sep 12, 2023 at 4:42 AM
To: Farizal Hakiki <admin@journal.uir.ac.id>

Dear Mr. Farizal,

Thank you and we appreciate the good news. However, we still have a question. As one of the reviewer's comments about the title, they suggest that the title might be better with this: "Comparative Study of Economic Evaluation of PSC Cost Recovery and PSC Gross Split Scheme for Expiry Block, Case Study Field A in Sumatera". Therefore, we changed it in the manuscript revision. Meanwhile, the original title registered in the system is: "The Synergetic Economic Evaluation of PSC Cost Recovery and Gross Split Schemes on Field A". Shall we change the title to the reviewer's advice, or stick to the original title? Looking forward to the solution. Thank you in advance.

Best regards,
Prayang Sunny Yulia



[Quoted text hidden]

**Prayang Sunni** <prayang@trisakti.ac.id> Tue, Sep 12, 2023 at 4:51 AM
To: "F. Hakiki Soemarsono" <farizal.hakiki@kaust.edu.sa>

[Quoted text hidden]

**Farizal Hakiki Soemarsono** <farizal.hakiki@kaust.edu.sa> Tue, Sep 12, 2023 at 7:22 AM
To: Prayang Sunni <prayang@trisakti.ac.id>

Dear Authors

You said you have changed it: as you replied on RESPONSE.

Also, for future RESPONSE and for any journal: You have to put your changes, e.g.:

Thanks for the comment. We have revised this part and accommodate your suggestion as written in Line 35-40:

COPY/WRITE DOWN YOUR REVISED STATEMENT or PUT THE REVISED TABLE/FIGURE

The point is you are not only providing the LINE but also the content (what it is), re-write the revision part in response.

Thanks

Regards,
Hakiki

> On Sep 12, 2023, at 06:51, Prayang Sunni <prayang@trisakti.ac.id> wrote:
>
> [Quoted text hidden]

**UNIVERSITAS TRISAKTI**
***"Is a one stop learning for sustainable development"***
Kampus A, Jl. Kyai Tapa No.1, Grogol
Jakarta Barat 11440 - INDONESIA
www.trisakti.ac.id
(t) +62-21.566 3232, (f) +62-21.567 3001



---

**Prayang Sunni** <prayang@trisakti.ac.id> Tue, Sep 12, 2023 at 8:38 AM
To: Farizal Hakiki Soemarsono <farizal.hakiki@kaust.edu.sa>

Dear Mr. Hakiki,

Thank you for the response and advice.

Therefore, and to clarify, will our upcoming paper be published with the revised title (Comparative Study of Economic Evaluation of PSC Cost Recovery and PSC Gross Split Scheme for Expiry Block, Case Study Field A in Sumatera) ?

Because, we cannot change into the revised title in “metadata”. Looking forward to any advice. Thank you.

Best regards,

Prayang

Therefore
[Quoted text hidden]

---

**F. Hakiki Soemarsono** <farizal.hakiki@kaust.edu.sa> Tue, Sep 12, 2023 at 8:47 AM
To: Prayang Sunni <prayang@trisakti.ac.id>

There will be a copy editing process; stick on your revised version for your edited manuscript.
The copy editor will contact you.

[Quoted text hidden]

**Prayang Sunni** <prayang@trisakti.ac.id> Tue, Sep 12, 2023 at 9:40 AM
To: "F. Hakiki Soemarsono" <farizal.hakiki@kaust.edu.sa>

Thank you for your information.



[Quoted text hidden]

# Paper

*by* Prayang Sunny Yulia

---

**Submission date:** 10-Jan-2024 09:37AM (UTC+0700)
**Submission ID:** 2268666868
**File name:** prayangsunny.pdf (824.82K)
**Word count:** 4625
**Character count:** 22750

**Available online: http://journal.uir.ac.id/index.php/JEEE/index**

**Journal of Earth Energy Engineering**

**Publisher: Universitas Islam Riau (UIR) Press**

# Comparative Study of Economic Evaluation of PSC Cost Recovery and PSC Gross Split Scheme for Expiry Block, Case Study Field A in Sumatera

Prayang Sunny Yulia[1*], Adji Nadzif Sidqi[1], Syamsul Irham[1], Mustamina Maulani[1], Puri Wijayanti[1]
[1]Department of Petroleum Engineering, Faculty of Earth Technology and Energy, Universitas Trisakti, Jalan Kyai Tapa nomor 1, Grogol, Jakarta Barat -11450, Indonesia
*Corresponding Author: prayang@trisakti.ac.id

**Article History:**

Received: May 1, 2023
Receive in Revised Form: August 14, 2023
Accepted: September 11, 2023

**Keywords**:

Production Sharing Contract, Gross Split, Cost Recovery, Petroleum Economics, Investment

**Abstract**

In August 2021, there was an alteration in the production-sharing contract for Field A, which is located at Rokan Block, Riau Province. In Field A, the methods that were applied were waterflood and artificial lift by using an Electrical Submersible Pump (ESP). This block is an expiry block, whereas a new block is due to contract expiry from the previous contractor. The contract previously used was a Production Sharing Contract (PSC) Cost Recovery, which changed to PSC Gross Split. This contract comparison aims to synergistically evaluate the comparison of the two economic models and also to determine a more efficient and appropriate scheme to be applied to field A, as well as to analyze the parameters that can affect the economic indicators of field A. The results of the economic analysis that has been carried out show that the PSC Gross Split scheme is better than the PSC Cost Recovery scheme. The NPV of the PSC Gross Split scheme for 30 wells was $37,903,000, and the PSC Cost Recovery scheme for 30 wells was $13,850,000. From 30 wells, the result decided on the A6 Well, which the NPV of A6 Well has the best NPV for both schemes based on the contractor's point of view, $494,000 for the PSC Cost Recovery, and $ 1,380,000 for the PSC Gross Split. The Pay Out Time (POT) is derived as well from A6 Well for both schemes, which is 1.39 years for PSC Cost Recovery and 1.2 years for PSC Gross Split. The Interest Rate of Return (IRR) of PSC Cost Recovery is 146% on the A19 Well, and for PSC Gross Split is 408% on the A4 Well. The sensitivity analysis that has been carried out shows that the parameters of the amount of oil production and the price of oil have a significant effect on both schemes.

## INTRODUCTION

There are two types of production-sharing contracts in the oil and gas industry, namely PSC Cost Recovery and PSC Gross Split. PSC Cost Recovery, namely the return of operating costs in the amount incurred by the contractor (Ariyon et al., 2020). Meanwhile, PSC Gross Split, components from PSC Cost Recovery such as Equity to be Split (ETS) and First Tranche Petroleum (FTP) are eliminated, and contractors who use the PSC Gross Split will receive a larger additional split, especially if the work area has higher risk and more complicated and challenging operation activities (Adityawarman et al., 2020). Based on the work system, PSC can be analogized and also illustrated by the existence of a work contract, namely between the state as the owner and holder of natural resources, and the contractor who has the role of investor (Afiati et al., 2020).

In this case, the contractor in carrying out and carrying out its activities will receive compensation in the form of production from oil and gas fields. If it produces, then there is a distribution of income that will be received by the executor and the state party, and also based on the principle of consensual in an agreement. This research was conducted to find out which contract scheme is profitable for a field by using the data owned and assumed (Sidqi et al., 2022).

DOI: 10.25299/jeee.2023.12530
eISSN: 2540-9352 pISSN: 2301-8097

This research is located in the Rokan Block, Riau Province. In the working area, 30 wells from field A will be analysed. This field uses the PSC Gross Split scheme, which previously used the PSC Cost Recovery scheme. The new contract in this Working Area starts from 2021 to 2041. The purpose of this change in the scheme is so that oil and gas exploration and exploitation activities can be more effective and efficient. The government also does not need to bear the burden, because the investment and operational costs are fully borne by the contractor in the PSC Gross Split scheme (Daniel, 2017). With this change in the contract scheme, something should be done by the contractor to attain a good result of economic feasibility (Irham et al., 2018).

**METHOD**

This research was conducted to find out and evaluate the economic results of the two schemes. The collection of data is by secondary data. The comparison of PSC Cost Recovery and Gross Split schemes can be seen as the following Figure 1.

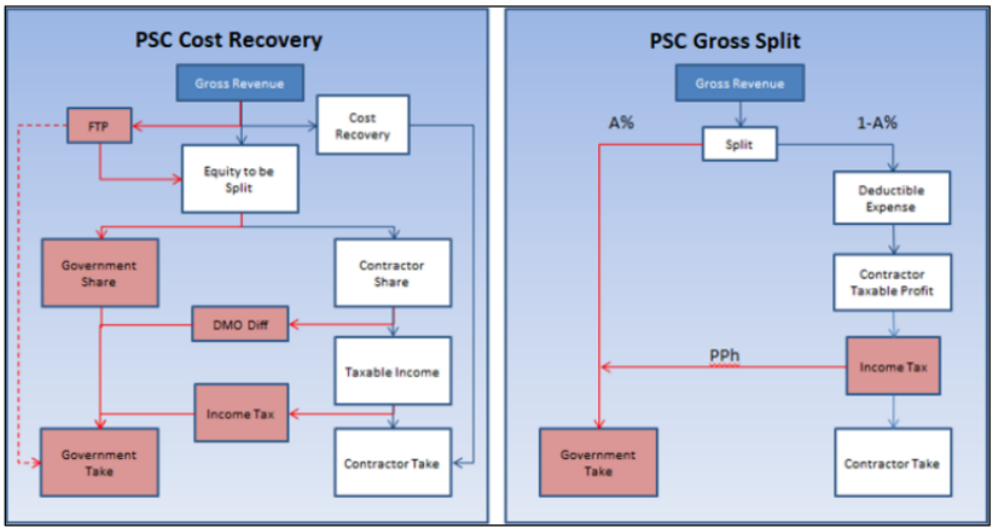



Figure 1. Comparison of PSC Cost Recovery and Gross Split schemes (Anjani & Baihaqi, 2018)

The most significant difference between the two schemes is the presence and absence of cost recovery, and the government is no longer burdened with cost recovery from the oil and gas development (Anjani & Baihaqi, 2018).

In PSC Cost Recovery, the Indonesian government and contractor have the authority to seize 20% of gross income prior to the cost recovery process (Kesumaputri & Irham, 2016). This is referred to as first tranche petroleum (FTP). Unlike royalty, the proportion of FTP is split between the government and the contractor. The percentages for the government and contractor in terms of oil share are 71.1538% and 28.8462%, respectively (Giranza & Bergmann, 2018). In the PSC Cost Recovery scheme, State Revenue Tax uses the assume and discharge principle, where the calculation of the state's share and the contractor's share already includes a tax component, therefore the contractor is not charged any other additional taxes and is not a component of CAPEX and OPEX. PSC Cost recovery is the return of costs incurred by the contractor for exploration, development, and operating costs beyond gross income. Most production-sharing contracts have limits on the amount of contractor income recognized to get a refund but not all costs can be requested for repayment, such as last year's funding, and refunded in the event year. The limitation of cost recovery or the limit of the refund limit as commonly known ranges from 30% - 60%. Generally, there are cost controllable costs in administering administration, while uncontrollable costs include efforts to find additional reserves through exploration and development activities and the addition of production facilities (Arifin & Hidayat, 2021).

The PSC Gross Split, does not have a cost recovery mechanism; therefore, PSC contractor income comes solely from its gross production sources and also has to pay income tax to the government in connection with this income (Irham & Julyus, 2018). Government revenue will consist of the government's gross share of production, bonuses, PSC contractors' income taxes, and indirect taxes paid by PSC Contractors. According to the Regulation of the Minister of Energy and Mineral Resources of Indonesia No. 52 of 2017, the basic division for PSC Contractors is 43% for oil and 48% for gas (Ariyon et al., 2020). The oil split can

**Journal of Earth Energy Engineering**
Vol. 12 No. 2, October 2023, pp 85-95

be increased or decreased through variable split and progressive split, according to Minister Regulation No. 08/2017 on Indonesian PSC Gross Split (Pramadika & Satiyawira, 2019). The variable split is an oil split modification depending on field factors such as field status, field location, block status, reservoir depth, reservoir type, supporting infrastructure availability, carbon dioxide concentration, and domestic component level. This split will also be altered based on progressive criteria such as oil price, cumulative oil and gas output, and economic levels (Giranza & Bergmann, 2018).

Referring to Figure 2 below, the data referred to the whole of oil production data, Capital Expenditure (CAPEX) and Operating Expenditure (OPEX) costs, oil prices, and also contract policies. The data is used to calculate the economy, and also for sensitivity analysis using the economic parameters that have been obtained. The figure below shows the steps of the research as depicted on flowchart as follows.

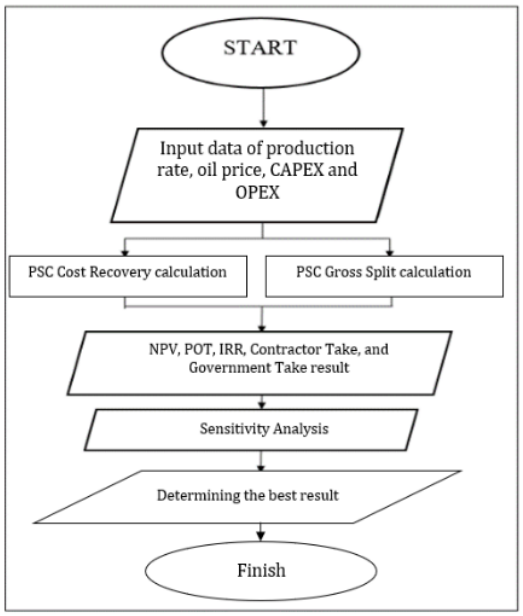



Figure 2. Research Workflow

Based on the flowchart above, the first step taken for this research was to enter production rates, oil prices, and expenditures (CAPEX and OPEX). Furthermore, the following step was with the available fiscal terms, the economic calculation is carried out using the PSC Cost Recovery and PSC Gross Split schemes. After obtaining the economic results from the PSC Cost Recovery and PSC Gross Split schemes, economic indicators (NPV, IRR, POT, Contractor Take, and Government Take) are calculated. Moreover, the next step was analysing the sensitivity of economic indicators. The final step was determining which scheme is the most appropriate and optimal for this field.

**RESULT AND DISCUSSION**

This field was only managed oil. Before calculating, data input is done first, such as production data, oil prices, CAPEX, and OPEX. The oil price at that period was $69 and the average oil production was 135,000 barrels. From the data that has been obtained, then calculations are carried out for both schemes. Gross Revenue earned was $9,281,000.

Table 1. Expenditures Per Well for Field A

| Expenditures | Total ($) |
|---|---|
| CAPEX | 1,136,000 |
| OPEX | 1,436,000 |

The table above (Table 1), CAPEX is divided into two classifications; tangible and intangible costs. Tangible costs are the costs of basic materials, sort of casing, tubing, wellheads, casing accessories, and well equipment subsurface. In addition, intangible costs are service costs, sort of rig rental, well service,

completion, general, and other production facilities. Meanwhile, OPEX is a cost incurred by a company for operation and maintenance.

Table 2. Fiscal Terms Contract Scheme PSC Cost Recovery

| Indicator | PSC Cost Recovery |
|---|---|
| FTP | 20% |
| Government Share (after tax) | 85% |
| Contractor Share (after tax) | 15% |
| Tax | 40.5% |
| DMO Volume | 25% |
| DMO fee (market price) | 15% |
| Depreciation rate | 25% |
| Depreciation life | 5 years |

In table 2, there are fiscal terms for the PSC Cost Recovery scheme, these terms are used when the work area still has a contract with the previous contractor and the contract ends in August 2021. The FTP distribution for the government and contractors is 20% of gross revenue, the contractor also submits a Domestic Market Obligation (DMO) of 25% of the total production obtained. Contract depreciation is 25% for 5 years, the depreciation method used is decline balance.

In the PSC Gross Split scheme, the split between the contractor and the government is divided into three, namely a base split, a variable split, and a progressive split. This refers to the Regulation of the Minister of Energy and Mineral Resources no. 52 of 2017. The base split for contractors is 43% and for the government 57%. After the base split, the next determination is the variable split, the comparison between standard classification and Field A (as the part of expiry block), as shown on Table 3 as below.

Table 3. Variable Split

| Parameter | Condition | Split Adjustment | Condition | Split Adjustment |
|---|---|---|---|---|
| | Standard | | Field A | |
| Field Status | POD I | 5% | No POD | 0% |
| | POD II | 3% | | |
| | No POD | 0% | | |
| Field Location | Onshore | 0% | Onshore | 0% |
| | Offshore (0<h≤20 m) | 8% | | |
| | Offshore (150<h≤1000 m) | 14% | | |
| | Offshore (>1000 m) | 16% | | |
| Reservoir Depth | <2500 m | 0% | <2500 m | 0% |
| | >2500 m | 1% | | |

Table 3. Variable Split (extended)

Journal of Earth Energy Engineering
Vol. 12 No. 2, October 2023, pp 85-95

| Parameter | Condition | Split Adjustment | Condition | Split Adjustment |
|---|---|---|---|---|
| | Standard | | Field A | |
| Infrastructure | Well Developed | 0% | Well Developed | 0% |
| | New Frontier Offshore | 2% | | |
| | New Frontier Onshore | 4% | | |
| Reservoir Condition | Conventional | 0% | Conventional | 0% |
| | Non-Conventional | 16% | | |
| $CO_2$ (%mol) | <5% | 0% | <5% | 0% |
| | 5%≤x≤10% | 0.5% | | |
| | 40%≤x≤60% | 2% | | |
| | x≥60% | 4% | | |
| $H_2S$ (ppmV) | <100 | 0% | <100 | 0% |
| | 100≤x<1000 | 1% | | |
| | 1000≤x<2000 | 2% | | |
| | 2000≤x<3000 | 3% | | |
| | 3000≤x<4000 | 4% | | |
| | x≥4000 | 5% | | |
| Specific Gravity Oil | API<25 | 1% | API>25 | 0% |
| | API≥25 | 0% | | |
| Local Content (%) | 30%≤X≤50% | 2% | 50%<x<70% | 3% |
| | 50%≤x≤70% | 3% | | |
| | 70%≤x<100 | 4% | | |
| Production Phase | Primary | 0% | Secondary | 6% |
| | Secondary | 6% | | |
| | Tertiary | 10% | | |

After the variable split is determined, the next step is to determine the progressive split based on the cumulative annual oil production and oil prices.

Table 4. Progressive Split

| Parameter | Condition | Split Adjustment |
|---|---|---|
| Oil Price | (85-ICP) x 2.5% | 3.75% |
| Cumulative Production | >30 MMBOE | 0% |

This working area split adjustment is 3.75%. Because of Cumulative Production was more than > 30 MMBOE in 2022, the split adjustment is 0% based on the Table 4 above.

Furthermore, Figure 3 below shows the economic results based on NPV of 30 wells from Field A with the PSC Cost Recovery and PSC Gross Split contract scheme. The NPV of the PSC Cost Recovery scheme contractor from A6 Well is $494,000. Meanwhile, the NPV of the PSC Gross Split scheme contractor from A6 Well is $1,380,000. Both from two PSC schemes, A6 Well has the highest NPV compared to other wells, therefore A6 Well is the well with the best prospects.

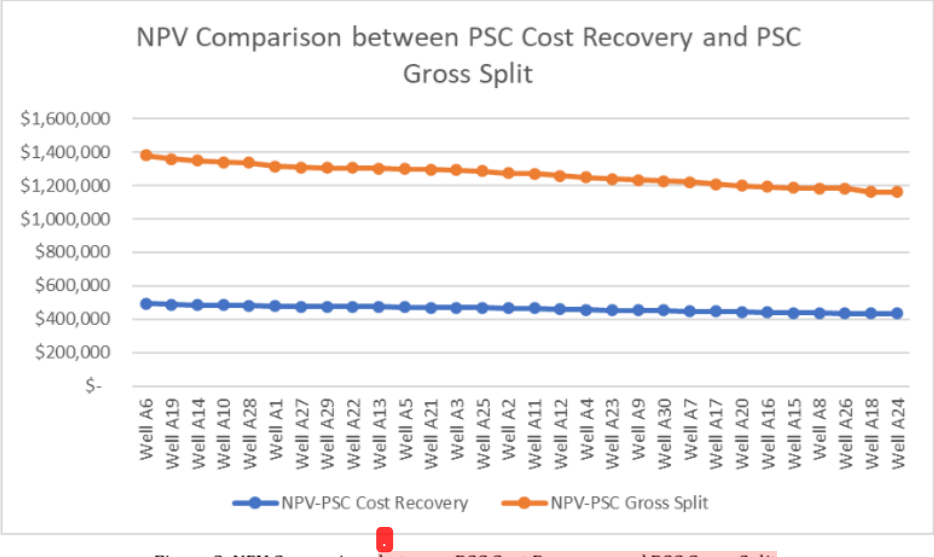



Figure 3. NPV Comparison between PSC Cost Recovery and PSC Gross Split

After the comparison of NPV, Figure 4 below will be shown the comparison of the POT between both schemes, PSC Cost Recovery and Gross Split. The graphic of POT is shown in a year and conversely, the shortest its year, the most profitable the project will be. The graphic can be seen as follows:

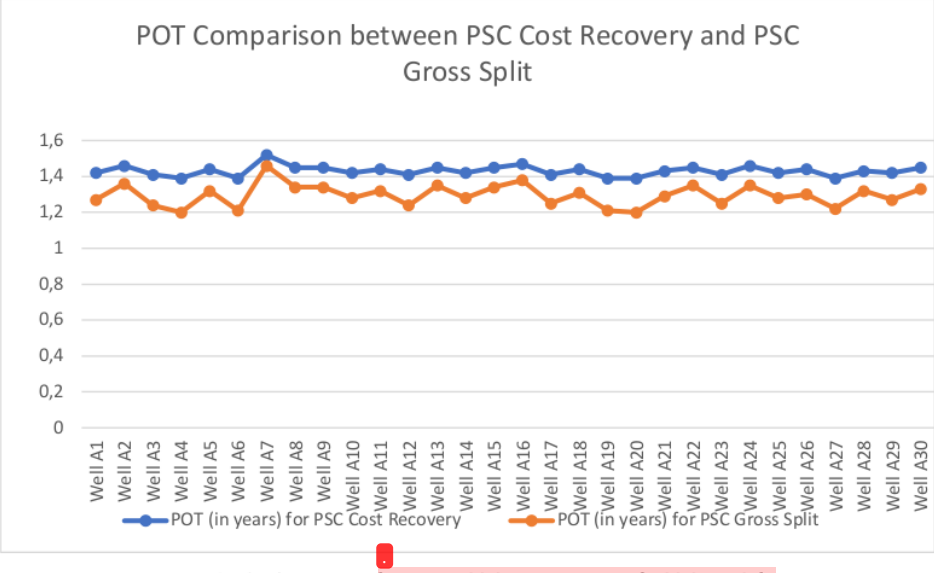



Figure 4. POT Comparison between PSC Cost Recovery and PSC Gross Split

According to the Figure 4 above, the shortest POT for PSC Cost Recovery scheme is Well A4, A6 and A27 with 1.39 years. Meanwhile, the POT for PSC Gross Split scheme is Well A4 with 1.2 years. As the result, the shortest year of them all is Well 4 for PSC Gross Split scheme, with 1.2 years.

After determining the POT, the following Figure 5 will be shown another indicator the IRR, which has been compared between PSC Cost Recovery and Gross Split. Conversely, the decent IRR amount is above the MARR (Minimum Attractive Rate of Return), which for this company, the MARR is 10%. The figure can be seen as follows:

Journal of Earth Energy Engineering
Vol. 12 No. 2, October 2023, pp 85-95

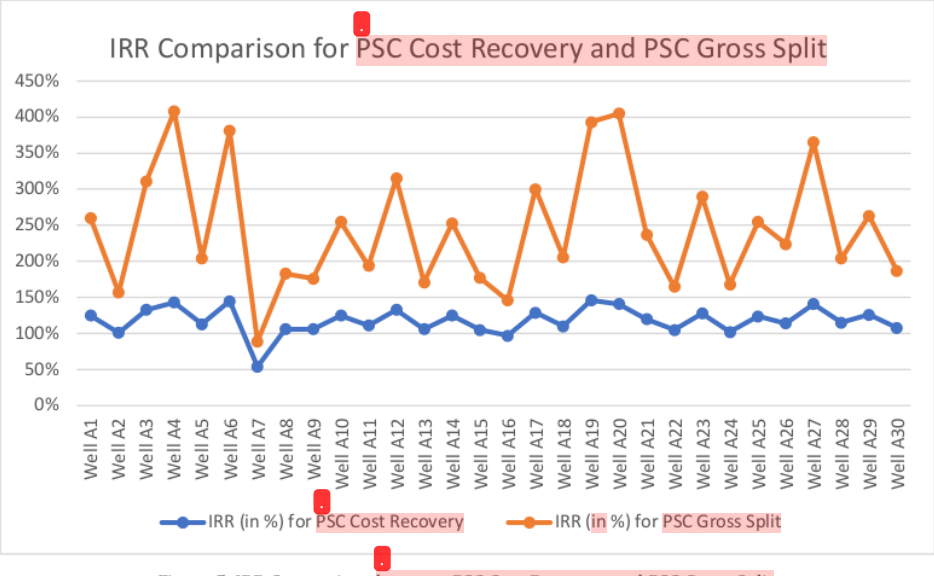



Figure 5. IRR Comparison between PSC Cost Recovery and PSC Gross Split

As the result above, the highest IRR for PSC Cost Recovery is 146% on Well A19, meanwhile, the highest IRR for PSC Gross Split is 408% on Well A4. Collecting from the highest results, it can be determined that the first place goes to, Well A4 PSC Gross Split scheme.

The following indicator is Contractor Take, which is to indicate the total share owned by the contractor, after the tax deduction for the government. The comparison graph can be seen at Figure 6 as follows:

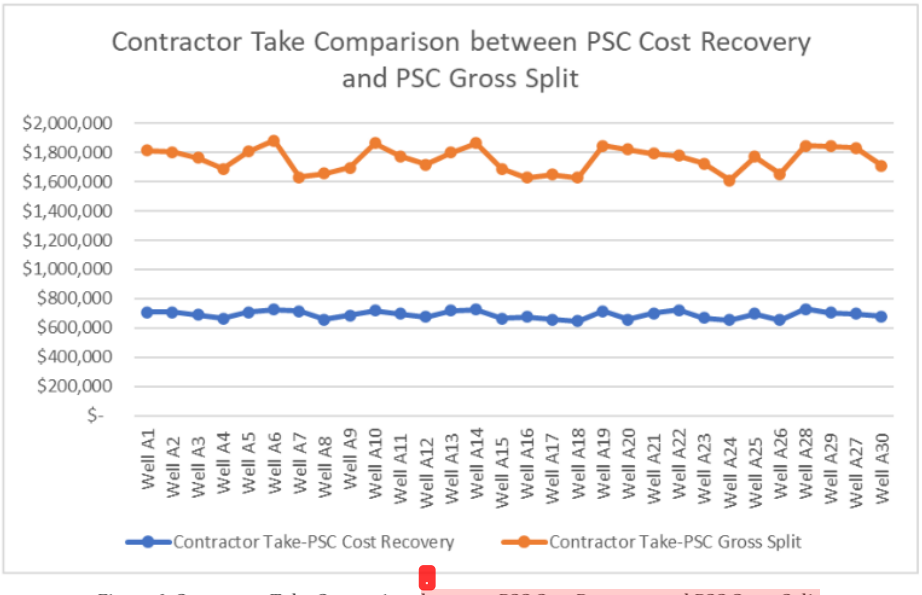



Figure 6. Contractor Take Comparison between PSC Cost Recovery and PSC Gross Split

Referring to Figure 6, the highest amount Contractor Takes for PSC Cost Recovery is $ 728,000 on Well A28. On the other hand, for PSC Gross Split is $ 1,879,000 on Well A6. As same as the previous indicators, the greatest amount is still at PSC Gross Split.

The last indicator to be compared in this research is Government Take as the portion received by the government, as well as added taxes from the contractor. The graph can be seen in Figure 7 as follows:

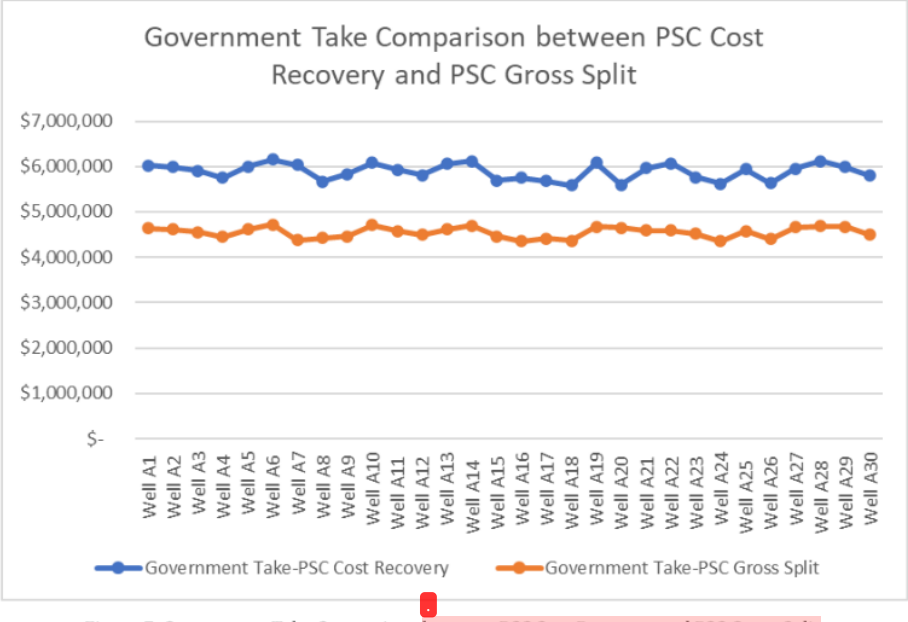



Figure 7. Government Take Comparison between PSC Cost Recovery and PSC Gross Split

Based on Figure 7, it can be determined that the highest amount of Government Take for PSC Cost Recovery is $ 6,154,000 on Well A6, then for PSC Gross Split is $ 4,721,000 on Well A6. Both wells showed the highest amount of Government Take, however, the highest amount was taken by the PSC Cost Recovery.

As the result of the indicators that has been compared, the highest results from both schemes are shown in Table 5 as follows:

Table 5. Calculation Results of the Best PSC Cost Recovery and Gross Split

| Indicator | Well (CR & GS) | Cost Recovery | Gross Split |
|---|---|---|---|
| NPV | A6 & A6 | $ 494,000 | $ 1,380,000 |
| POT | A6 & A6 | 1.39 year | 1.2 year |
| IRR | A19 & A4 | 146% | 408% |
| Contractor Take ($) | A28 & A6 | $ 728,000 | $ 1,879,000 |
| Government Take ($) | A6 & A6 | $ 6,154,000 | $ 4,721,000 |

The table above (Table 5) shows the best well results from the indicators of the two schemes. These results indicate which well to drill first, according to the NPV results. This is because the drilling is done based on the highest economic results.

The following figure (Figure 8), there will be shown about four parameters are carried out for sensitivity analysis: oil production, CAPEX, OPEX, and oil prices. In this scheme, oil production and oil prices are very sensitive and affect the NPV, this can happen because, if the sensitivity percentage is increased or decreased, there will be a significant increase or decrease. Some parameters are analysed for sensitivity, the same as PSC Cost Recovery. Even in the PSC Gross Split scheme, the amount of oil production and oil prices are very sensitive to the NPV, but in this scheme, oil production changes more significantly than oil prices. The well used is well A6, which is well with the best NPV of the other wells. The well has been analyzed for sensitivity and shows that the amount of oil production and the price of oil in the PSC Cost Recovery scheme are very influential and sensitive to NPV, this is because if the percentage of sensitivity when the amount of oil production and the price of oil are reduced, a very significant decrease occurs, and if the sensitivity of the amount of oil production and the price of oil is increased, a very significant increase occurs.

Journal of Earth Energy Engineering
Vol. 12 No. 2, October 2023, pp 85-95

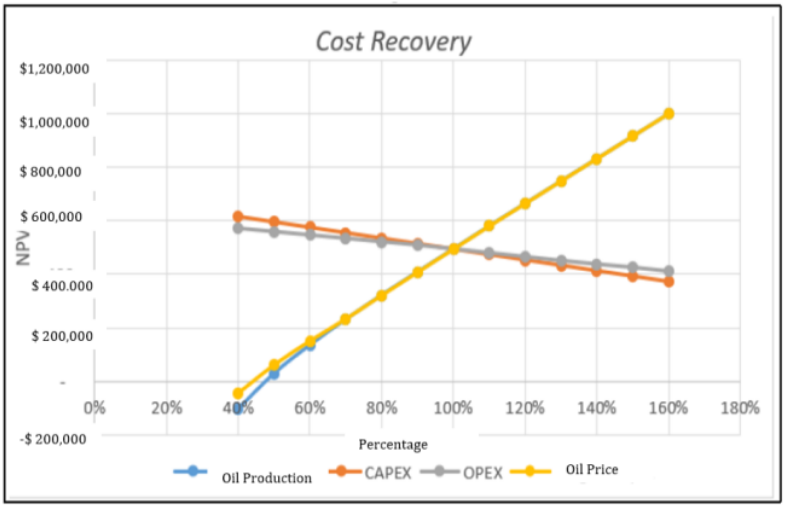



Figure 8. NPV Sensitivity Analysis on Best Well for PSC Cost Recovery

In Figure 9 below, some parameters are analysed for sensitivity, as same as PSC Cost Recovery. Even in the PSC Gross Split scheme, the amount of oil production and oil prices are very sensitive to the NPV, but in this scheme, oil production changes more significantly than oil prices. This is because if the sensitivity percentage of the amount of oil production and the price of oil is decreased or increased, there will be a very significant decrease and increase.

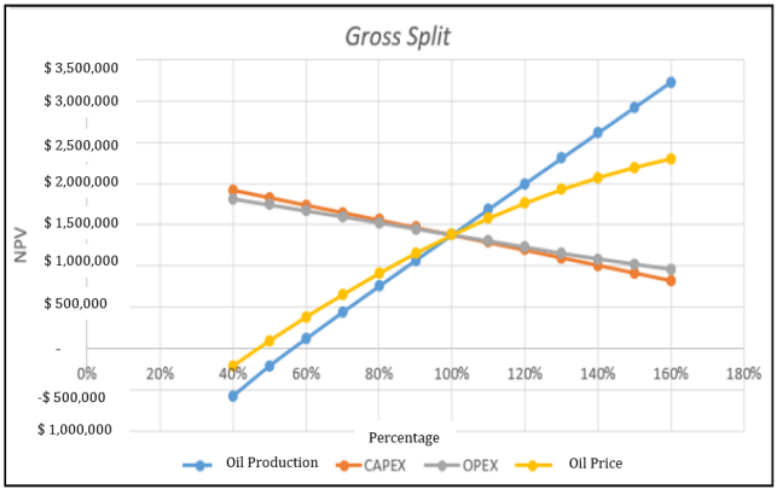



Figure 9. NPV Sensitivity Analysis on Best Well for PSC Gross Split

**DISCUSSION**

The PSC Gross Split produced better value than the PSC Cost Recovery scheme in terms of contractor income. The value of CAPEX and OPEX from the PSC Cost Recovery and PSC Gross Split schemes has differences, because in the PSC Gross Split scheme, state revenue tax is the full responsibility of the contractor, and OPEX is included in state revenue tax in this scheme.

The NPV of the PSC Gross Split scheme for 30 wells was $ 37,903,000; and the PSC Cost Recovery scheme for 30 wells was $ 13,850,000. Therefore, the NPV of the PSC Gross Split is greater than the PSC Cost Recovery in the 30 wells in Field A based on the point of view contractor.

After that, from 30 wells, the result decided on the A6 Well, which the NPV of A6 Well has the best NPV for both schemes based on the contractor's point of view, which is $ 494,000 for the PSC Cost Recovery, and $ 1,380,000 for the PSC Gross Split. The best period of POT derived from A6 Well for both schemes, which is

1.39 years for PSC Cost Recovery and 1.2 years for PSC Gross Split. The percentage of IRR has been determined on its greatest amount for both schemes that derived from A19 Well for PSC Cost Recovery in 146% and A4 Well for PSC Gross Split in 408%.

The contractor take for 30 wells in Field A with the PSC Gross Split scheme was higher than the PSC Cost Recovery. The contractor takes from PSC Gross Split amounted to $52,544,000; while Contractor takes from PSC Cost Recovery amounted to $20,741,000.

The government take from 30 wells in Field A with the PSC Cost Recovery scheme is higher than the Gross Split PSC. The government take for the PSC Cost Recovery scheme was $176,588,000, and for the Gross Split PSC scheme was $136,400,000.

**CONCLUSION**

According to the research that has been done and the discussion that has been described, it can be concluded that the NPV of the Gross Split PSC scheme for 30 wells is greater than the PSC Cost Recovery. A6 Well is well with the best NPV in both contract schemes. The Contractor Takes 30 wells with PSC Gross Split greater than PSC Cost Recovery. Meanwhile, for the Government Take 30 wells, the PSC Cost Recovery scheme is larger than the Gross Split PSC.

Based on the sensitivity analysis that has been carried out by increasing and decreasing the value of the economic parameter by approximately 60% of the original value, it can be concluded that the higher the percentage value of the total production and oil price, the better the NPV. However, for CAPEX and OPEX, it will be better if the percentage value is lower.

The advice that can be given is, contractors who use the Gross Split PSC contract scheme to be able to better maintain production levels but with the use of effective and efficient costs, this is because the increase in CAPEX and OPEX costs in the Gross Split PSC scheme is more sensitive to NPV compared to the PSC scheme Cost Recovery.

**ACKNOWLEDGEMENT**

The author is grateful to be able to finish this article. It is hoped that this journal can provide benefits to all readers. The author is also very grateful to the Dean of the Faculty of Earth and Energy Technology (FTKE) Universitas Trisakti, the Director of Research and Community Service (LPPM) Universitas Trisakti, and field supervisors from Pertamina Hulu Rokan.

**REFERENCES**

Adityawarman, A., Aziz, F. A., Aziz, P. A., Yusgiantoro, P., & Chandra, S. (2020). Economic Evaluation of Fiscal Regime on EOR Implementation in Indonesia: A Case Study of Low Salinity Water Injection on Field X. *Journal of Earth Energy Engineering*, *9*(1), 17–35. https://doi.org/10.25299/jeee.2020.4608

Afiati, N., Irham, S., & Pramadika, H. (2020). ANALISIS KEEKONOMIAN BLOK NSRN DENGAN MENGGUNAKAN PSC GROSS SPLIT DAN PENAMBAHAN DISKRESI. *Petro: Jurnal Ilmiah Teknik Perminyakan*, *9*(2).

Anjani, B. R., & Baihaqi, I. (2018). Comparative analysis of financial Production Sharing Contract (PSC) cost recovery with PSC gross split: Case study in one of the contractor SKK Migas. *Journal of Administrative and Business Studies*, *4*(2). https://doi.org/10.20474/jabs-4.2.2

Arifin, K., & Hidayat, D. (2021). COST RECOVERY ANALYSIS IN PRODUCTION SHARING CONTRACT IN UPSTREAM OIL AND GAS INDUSTRY (STUDY ON GAS UPSTREAM INDUSTRIES INDONESIA). *Dinasti International Journal of Economics, Finance and Accounting*, *1*(6). https://doi.org/10.38035/DIJEFA

Ariyon, M., Setiawan, A., & Reza, R. (2020). Economic Feasibility Study of Onshore Exploration Oil Field Development using Gross Split Contract. *IOP Conference Series: Materials Science and Engineering*, *847*(1). https://doi.org/10.1088/1757-899X/847/1/012030

Daniel, H. (2017, October 17). Indonesian Milestone in Production-Sharing Contract in Perspective of Government Take, Contractor Take, Cost Recovery and Production Target. *In SPE/IATMI Asia Pacific Oil & Gas Conference and Exhibition, Jakarta, Indonesia, Paper Number: SPE-187008-MS.* https://doi.org/10.2118/187008-MS

Giranza, M. J., & Bergmann, A. (2018). Indonesia's New Gross Split PSC: Is It More Superior Than the Previous Standard PSC? *Journal of Economics, Business and Management*, *6*(2).

Irham, S., & Julyus, P. (2018). The new energy management policy: Indonesian PSC-gross-split applied on steam flooding project. *IOP Conference Series: Earth and Environmental Science*, *106*, 012109. https://doi.org/10.1088/1755-1315/106/1/012109

**Journal of Earth Energy Engineering**
Vol. 12 No. 2, October 2023, pp 85-95

Irham, S., Sibuea, S. N., & Danu, A. (2018). The New Management Policy: Indonesian PSC-Gross Split Applied on CO2 Flooding Project. *IOP Conference Series: Earth and Environmental Science*, *106*(1). https://doi.org/https://doi.org/10.1088/1755-1315/106/1/

Kesumaputri, F. D., & Irham, S. (2016). Analisa Kelayakan Perpanjangan Kontrak Blok XO dengan Sistem Production Sharing Contract (PSC). *Seminar Nasional Cendekiawan 2015*, 379–386. https://doi.org/https://doi.org/10.25105/semnas.v0i0.256

Pramadika, H., & Satiyawira, B. (2019). PENGARUH HARGA GAS DAN KOMPONEN VARIABEL TERHADAP KEUNTUNGAN KONTRAKTOR PADA GROSS SPLIT. *PETRO:Jurnal Ilmiah Teknik Perminyakan*, *7*(3), 113–117. https://doi.org/10.25105/petro.v7i3.3817

Sidqi, A. N., Irham, S., & Yulia, P. S. (2022). Evaluasi Perbandingan Keekonomian 30 Sumur Skema PSC Cost Recovery dan Gross Split Lapangan A. *PETRO: Jurnal Ilmiah Teknik Perminyakan*, *11*(4), 191–195.

# Paper

ORIGINALITY REPORT

| 22% | 18% | 11% | 8% |
| --- | --- | --- | --- |
| SIMILARITY INDEX | INTERNET SOURCES | PUBLICATIONS | STUDENT PAPERS |

MATCH ALL SOURCES (ONLY SELECTED SOURCE PRINTED)

4%

★ iopscience.iop.org

Internet Source

| | | | |
| --- | --- | --- | --- |
| Exclude quotes | On | Exclude matches | < 15 words |
| Exclude bibliography | On | | |