

# Profitability Analysis of Gas Investment Using the Nigeria Petroleum Industry Act 2021 Fiscal Framework

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Submitted: 05-02-2022

Revised: 18-02-2022

Accepted: 20-02-2022

## ABSTRACT

The gas industry in Nigeria is evolving with lots of investment opportunities ranging from the upstream to the downstream sector of the industry. With the recent passage of the Petroleum Industry Act (PIA), economists and researchers now have a clear cut fiscal framework with which an evaluation of the profitability of investing in the gas industry can be carried out. The evaluation carried out in this study reveals that any increase in gas price favours both the host government and the contractor however, the contractors benefit more than the government, presenting a significant improvement compared to the prevalent fiscal policy prior to this time as we expect to see more investment by both the government and the contractors in the coming years.

**Keywords:** Petroleum Industry Act, Fiscal framework, Investment, Natural Gas, Profitability. Government, Contractor.

## I. INTRODUCTION

The oil and gas industry has a significant impact on the Nigeria's economy [1]. Though the industry contributes less than 10% to the country's gross domestic product, it contributes about 90% of the foreign exchange earnings and 60% of total income [2]. Consequently, any adverse change in the industry will have a big and long-term impact on government finances. The Federal Government set up policies to reduce gas flaring and improve the petroleum sector but faced slow growth. There were still gaps in the governance, infrastructure, and accountability. It became necessary to reform the entire petroleum sector in Nigeria. Better regulations, better returns on investment. The national move led to the birth of the Petroleum Industry Bill in 2000. Several attempts to pass the bill into law were unsuccessful for two decades. As a result, Nigeria lost about \$50 billion in investment over the last ten years. (3,4). Finally, the Nigerian President signed the Petroleum Industry Act (PIA) 2021 into law on August 16, 2021. PIA 2021 is coming at a time when major oil producers are converting to clean energy. Mixed reactions from stakeholders, as usual, on the new law. Nevertheless, the much-awaited reform in the oil and gas industry will be attainable with

accountability and transparency. The PIA also contains a fiscal framework for gas investment. The fiscal terms embedded in the PIA 2021 for investment in gas production in Nigeria is the same for both onshore and offshore investment [5]. It is therefore imperative that analysts take advantage of the availability of this document to bring forth useful insights to the end that investors and scholars can have a data base, information bank and models to easily make preliminary technical and financial decisions.

Determining the profitability of any investment, the fiscal systems governing that industry must be carefully studied and incorporated in the analysis and the economic indicators must be brought forth. The economic indicators include net cash flow, discounted cash flow, the host government take and the contractor take at the foreseeable scenarios, pay out time, internal rate of return and much more [6].

## II. MATERIALS AND METHODS

### Economic Modelling

Profitability of investments in the production of hydrocarbon are determined using economic modelling where the input variables are the production parameters and fiscal elements

embedded in a fiscal regime. The output variables are profitability indicators which are used to evaluate the viability of investments in hydrocarbon. This can be done using spreadsheet or a programming tool. Spreadsheet technique was adopted for this research. Cash flow modelling enable the determination of the profitability of investment in the production of hydrocarbon. A typical cash flow model is shown in Equation 1. This equation was used to forecast the cash flow for investment in a typical deep offshore gas field in the Niger Delta. The economic assumptions made for the investment is listed in Table 1.

The geological and geophysical cost of the project was \$14.4 MM. The cost for drilling wells was \$79.2 MM. The lease facilities and gathering cost was \$43.2 MM. The cost for the gas compressors and processing were \$72 MM and \$360 MM. The operating expenditure (OPEX) was

assumed to be 5% of the capital expenditure (CAPEX). The production forecast for the annual gas production was used as the source of revenue for the cash flow model. It was multiplied with the gas price to estimate the gross revenue of the investment. The profitability of the investment was evaluated using the fiscal terms specified for the investment depending on the nature of the contract. The fiscal terms in the petroleum industry bill 2020 serve as the base fiscal framework for investment analysis of this research. Other fiscal framework were also considered

- Net Cash Flow  

$$NCF_t = GR_t - ROY_t - CAPEX_t - OPEX_t - BONUST - \frac{PO}{G_t} - TAX_t - OTHER_t \quad \text{Equation 1}$$

Table 1: Economic Assumption

Item	Value	Unit
G&G	14.4	\$MM
Drilling Well	79.2	\$MM
Lease Facilities and Gathering	43.2	\$MM
Gas Compressors	72	\$MM
Gas Processing	360	\$MM
OPEX	5	%

### Evaluating the investment of Gas Production Using the PIA 2021 Fiscal Framework

The petroleum industry act 2021 fiscal framework was used as the base framework for analysis of gas investment in the deep offshore region of Nigeria. The petroleum industry bill has been the most anticipated bill for over a decade and it is the fiscal system that has a fiscal framework for gas investment. The fiscal terms embedded in the PIA 2021 for investment in gas production in Nigeria is the same for both onshore and offshore investment. The royalty rate specified for gas investment is 5% and this makes it a retrogressive framework as it does not allow the host government to give up some economic rent during periods of low oil price. Equation 3.4 was used to model the investment net cash flow. The yearly royalty was calculated from the gross revenue. The

PIA 2021 frame work for gas investment specify 5 years depreciation period. Hence, the capital expenditures were depreciated for five years for the purpose of tax calculation.

The taxable income was calculated and corporate income tax was deducted from it. The net cash flow after tax for both the contractor and host government were calculated. From the net cash flow of the investment, other profitability indicators such as the payout period, internal rate of return, front-end loading index and net present value were determined. Equation 3.5-3.8 were used to calculate these indicators. Different scenarios were evaluated as a function of oil price. The base case scenario had a gas price of \$3.5/MMSCF. While Scenario 2-4 had a gas price of \$3.3-3.7/MMSCF.

Table 2: Fiscal Terms in PIA 2021

Item	Value	Unit
Royalty	5	%
Depreciation	5	years
Cost recovery	100	%
Corporate Income Tax	30	%
Host community fund	3	%

- Internal Rate of Return (IRR)

$$\sum_{t=1}^n \frac{NCF_t}{(1 + IRR)^t} = 0 \quad \text{Equation 2}$$

- Unit Technical Cost (UTC)

$$UTC = \frac{(CAPEX + OPEX)}{\text{Reserve}} \quad \text{Equation 3}$$

- Contractor and Government Take

$$\text{Government Take (GT)} = \frac{\text{GovernmentNPV}}{(\text{GovernmentNPV} + \text{ContractorNPV})} \quad \text{Equation 4}$$

$$\text{Contractor Take (CT)} = \frac{\text{ContractorNPV}}{(\text{GovernmentNPV} + \text{ContractorNPV})} \quad \text{Equation 5}$$

### III. RESULTS AND DISCUSSION

Figure 1 and Figure 2 show the host government NCF and contractor NCF obtained from the gas investment using the fiscal framework enshrined in the PIA 2021.



Figure 1: Host government NCF of the gas investment using the PIA 2021 fiscal framework

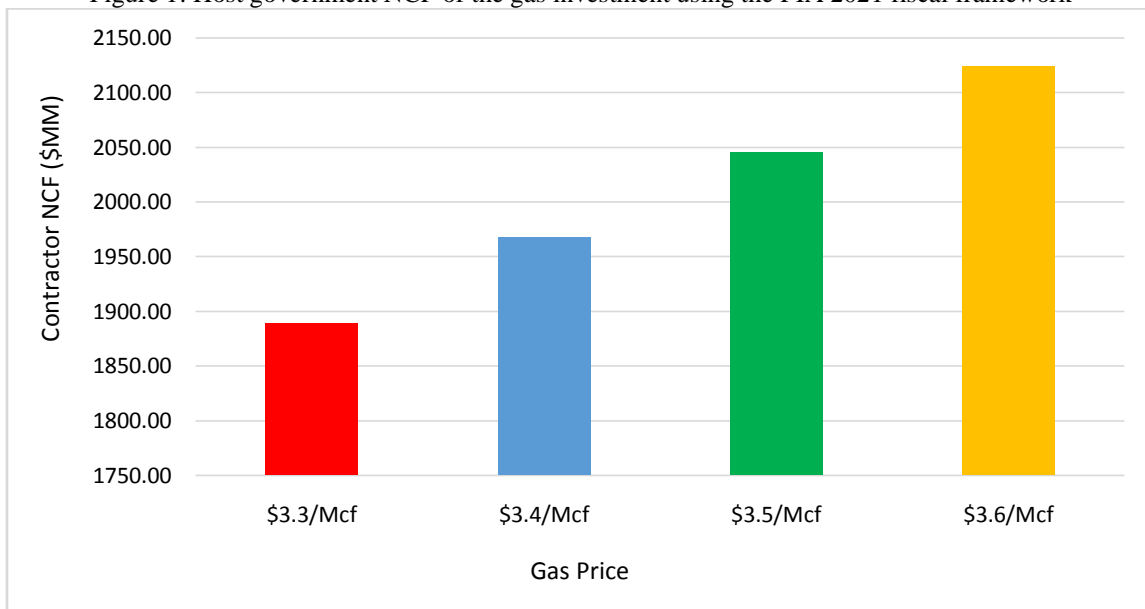


Figure 2: Contractor NCF of the gas investment using the PIA 2021 fiscal framework

Similarly, the higher the gas price, the higher the host government NPV and contractor's NPV. The host government and contractor's NPV is shown in Figure 3 and Figure 4 respectively. The host government and contractor's NPV when the gas price was \$3.3/Mcf were \$413.76 MM and \$769.72. When the gas price was \$3.5/Mcf, the host government and contractor's NPV were \$447.52 MM and \$837.17 MM. The contractor's

NPV was also higher than the host government NPV. The host government and contractor's NPV were higher than the value of the host government and contractor's NPV. This is because the NCF was discounted to time 0 using a discount factor 10 to determine the present value of the NCF. This is more reserve and enables the real time determination of the profitability of an investment.

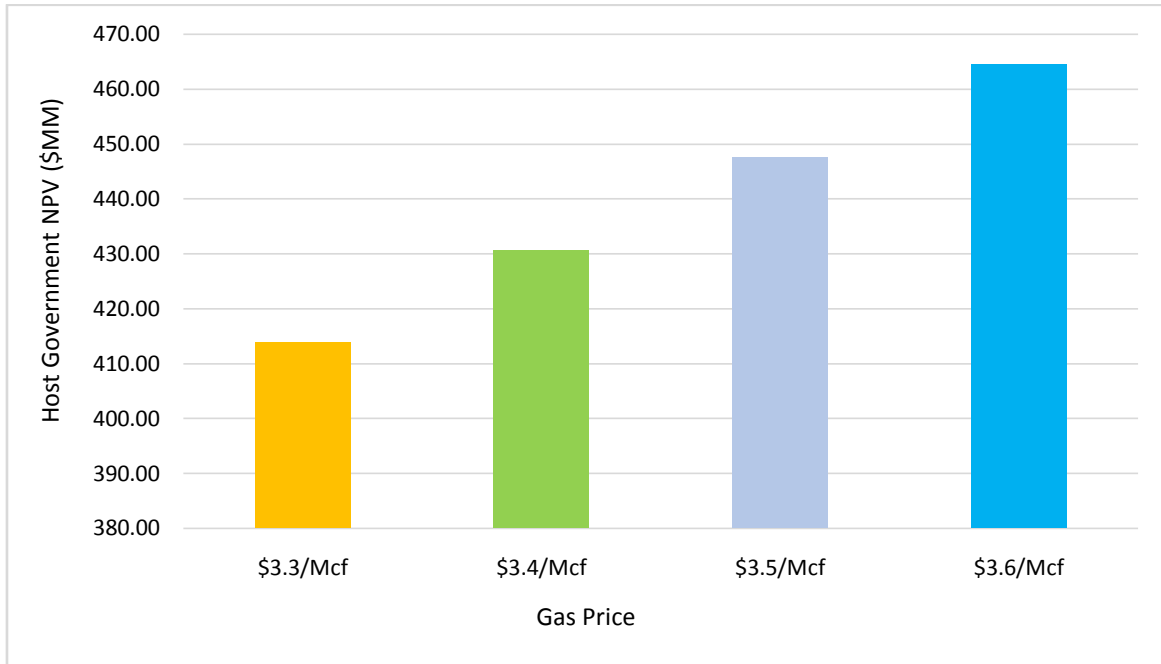


Figure 3: Host government NPV of the gas investment using the PIA 2021 fiscal framework

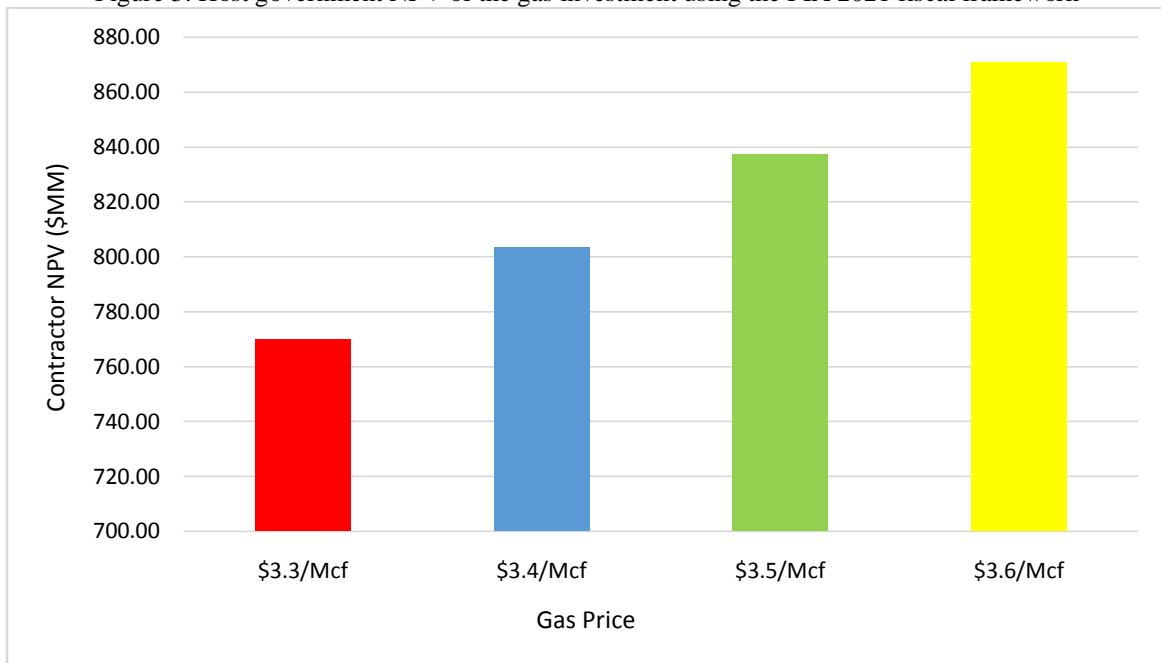


Figure 4: Contractor NPV of the gas investment using the PIA 2021 fiscal framework

The undiscounted government take and contractor's take is shown in Figure 5 and Figure 6. The undiscounted government take when the gas price were \$3.3/Mcf and \$3.5/Mcf were 34.70% and 34.61%. The undiscounted contractor's take when the gas price were \$3.3/Mcf and \$3.5/Mcf were 65.30% and 65.39%. The higher the gas price, there was a slight increase in the contractor's take

and a slight reduction in the government take. The discounted government and contractor's take is shown in Figure 7 and Figure 8. The discounted government take when the gas price were \$3.3/Mcf and \$3.5/Mcf were 34.96% and 34.84%. The discounted contractor's take when the gas price were \$3.3/Mcf and \$3.5/Mcf were 65.04% and 65.16%.

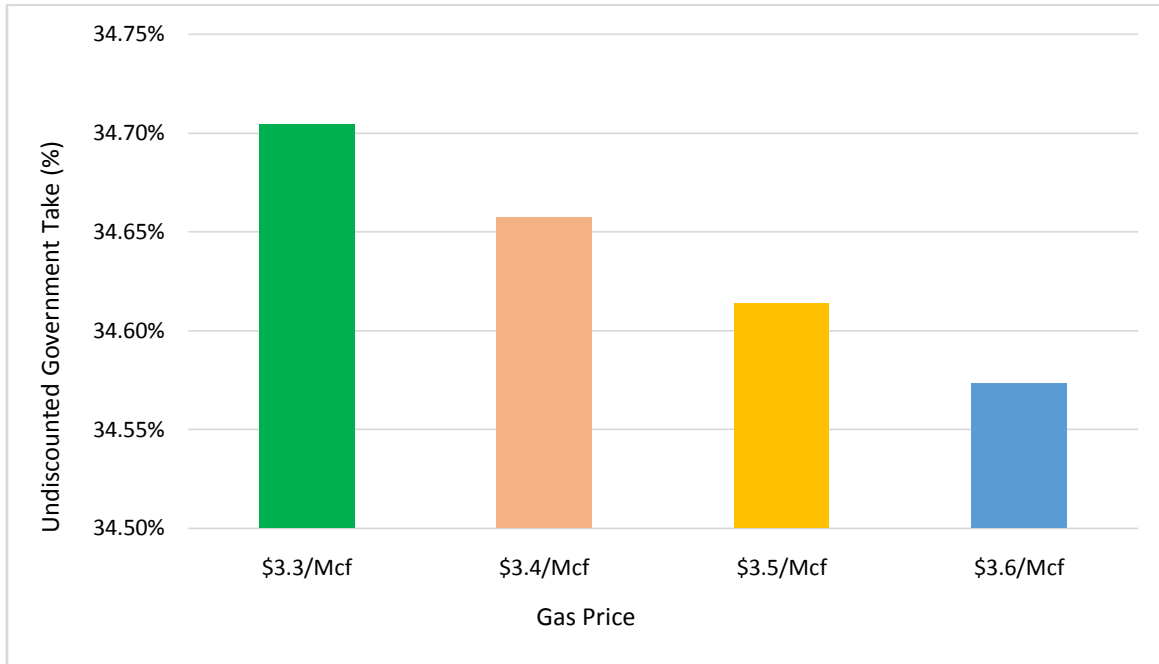


Figure 5: Undiscounted Host Government Take of the gas investment using the PIA 2021 fiscal framework

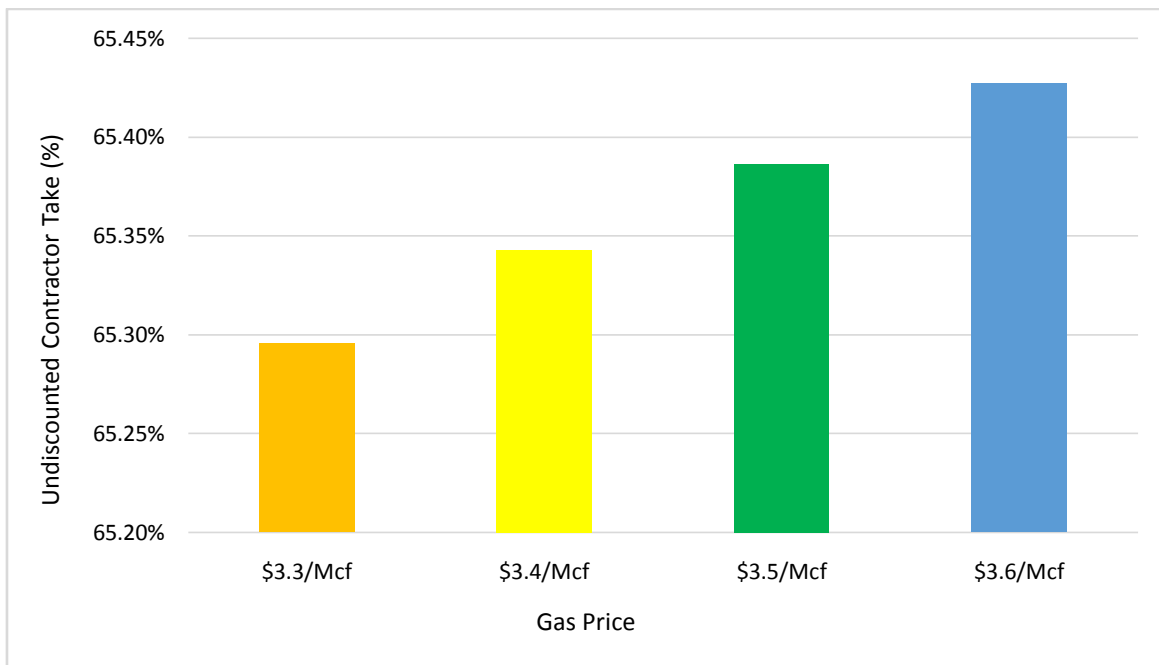


Figure 6: Undiscounted Contractor Take of the gas investment using the PIA 2021 fiscal framework

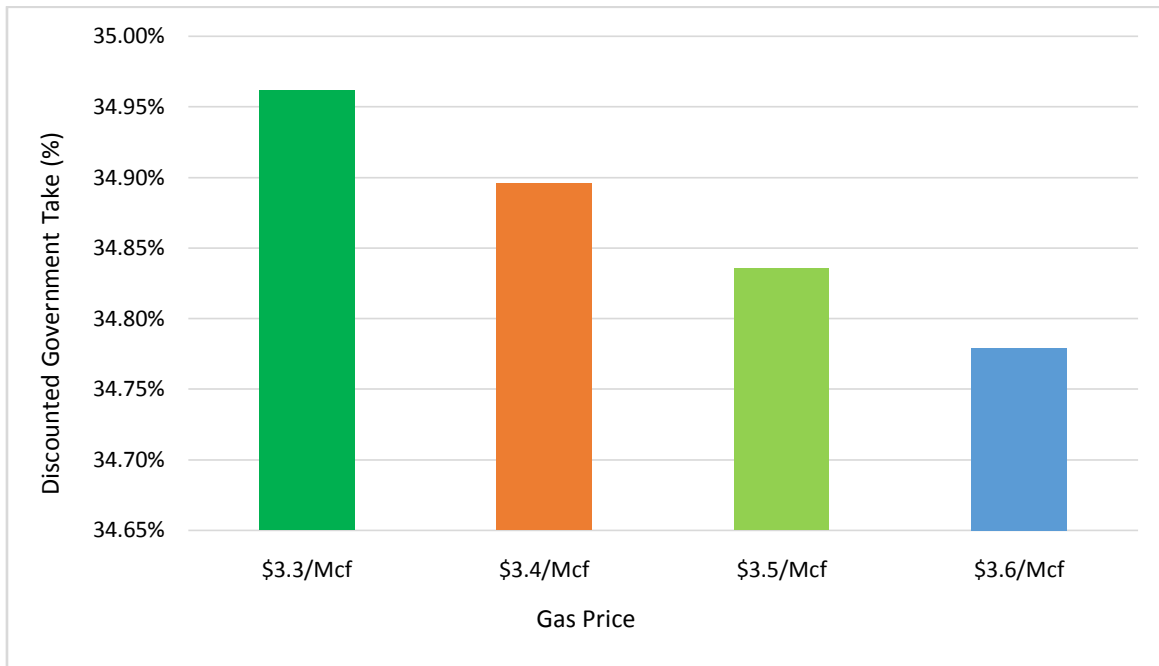


Figure 7: Discounted Government Take of the gas investment using the PIA 2021 fiscal framework.

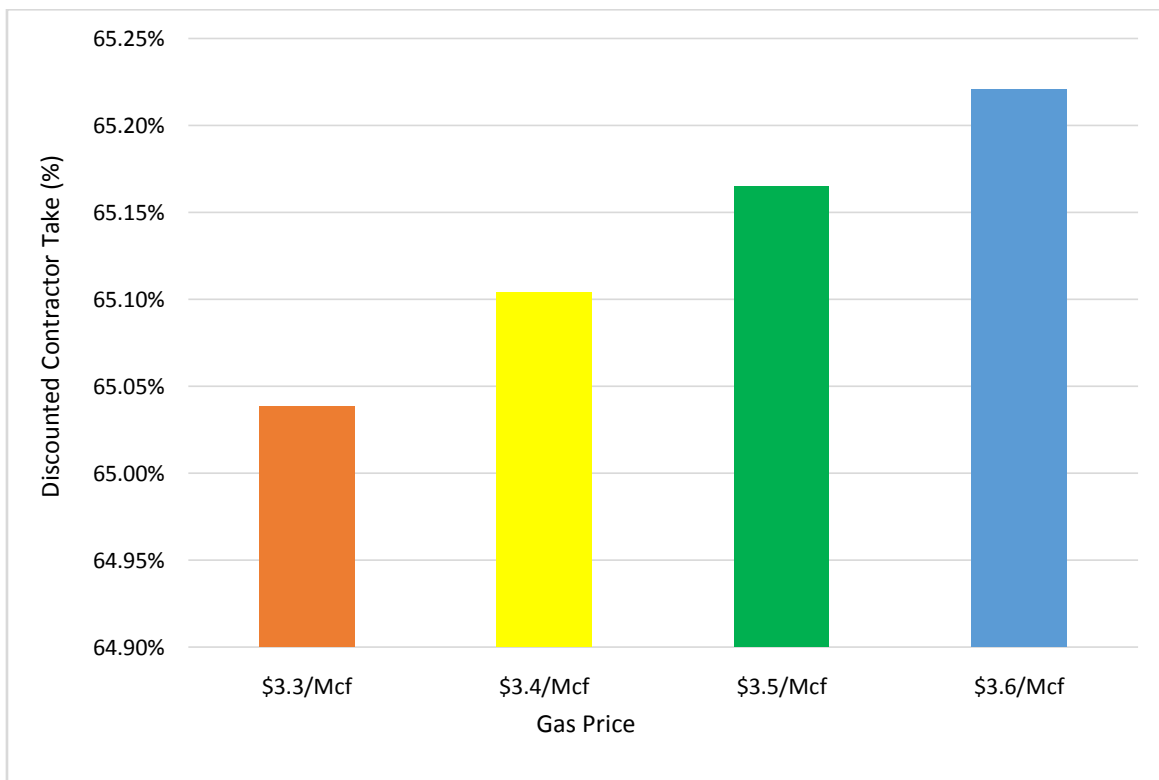


Figure 8: Discounted Contractor Take of the gas investment using the PIA 2021 fiscal framework.

One of the distinguishing factor that deters investment in the petroleum sector is the front-end loaded nature of oil and fiscal regime. The front-end loading index for the gas investment is shown in Figure 9. The higher the oil price, the lower the

front-end loading index. The front-end loading index when the gas price was \$3.3/Mcf was 0.0073 and when the gas price was \$3.6 Mcf, the front-end loading index was 0.0059. The higher the gas price,

the more the reduction in the front-end loaded nature of the fiscal system.

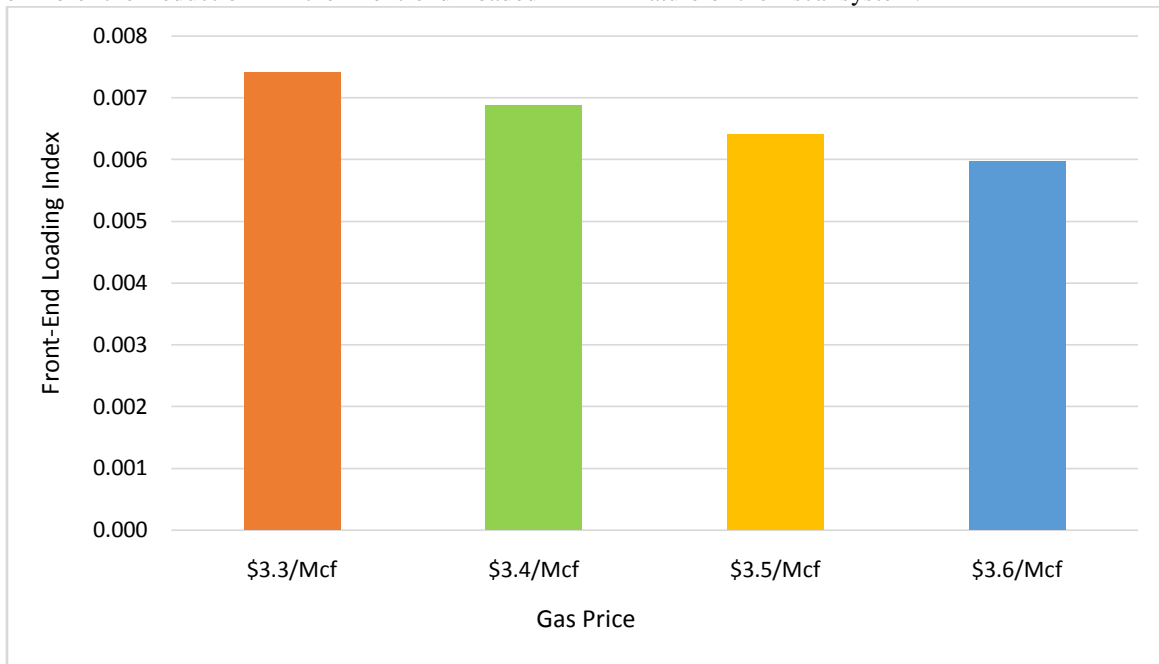


Figure 9: Front-End Loading Index of the gas investment using the PIA 2021 fiscal framework.

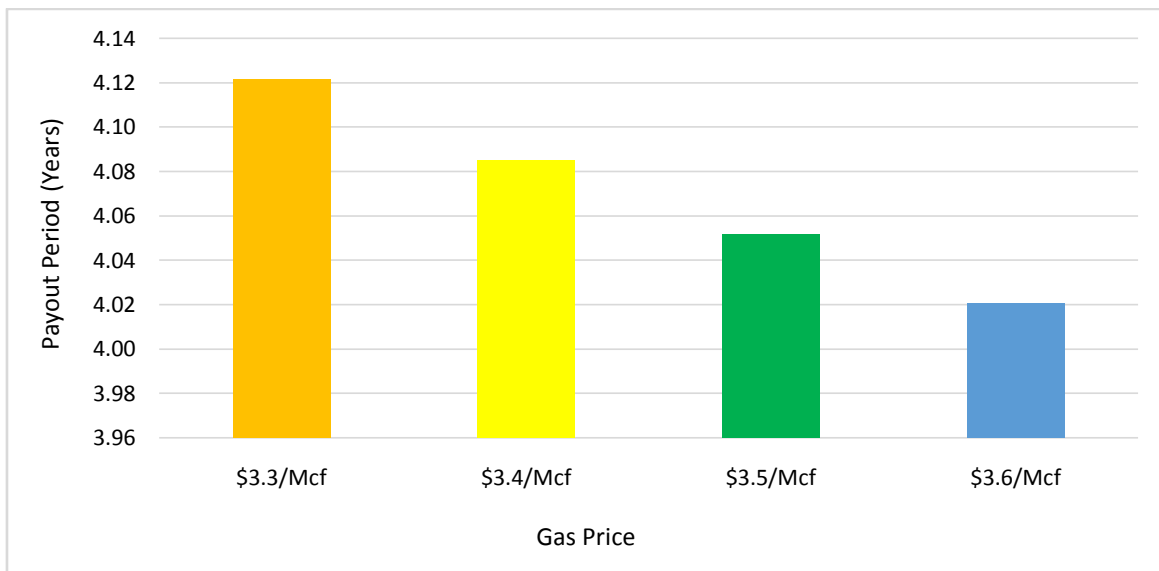


Figure 10: Payout Period of the gas investment using the PIA 2021 fiscal framework

The payout period of the investment is shown in Figure 10. The payout period when the gas price were \$3.3/Mcf and \$3.5/Mcf were 4.12 years and 4.05 years. While when the gas price was \$3.6/Mcf, the payout period was 4.02 years. The higher the price of the gas, the lower the payout period of the investment. This is because higher gas price leads to more revenue early during the life of

the investment and this will be used to recover the cost of the investment. The internal rate of return of the investment is shown in Figure 10. The higher the price of the gas, the higher the internal rate of return. The rate of return relates directly with the payout period. Both indicators are used to indicate the rate at which the contractor will recoup his cost of investment.



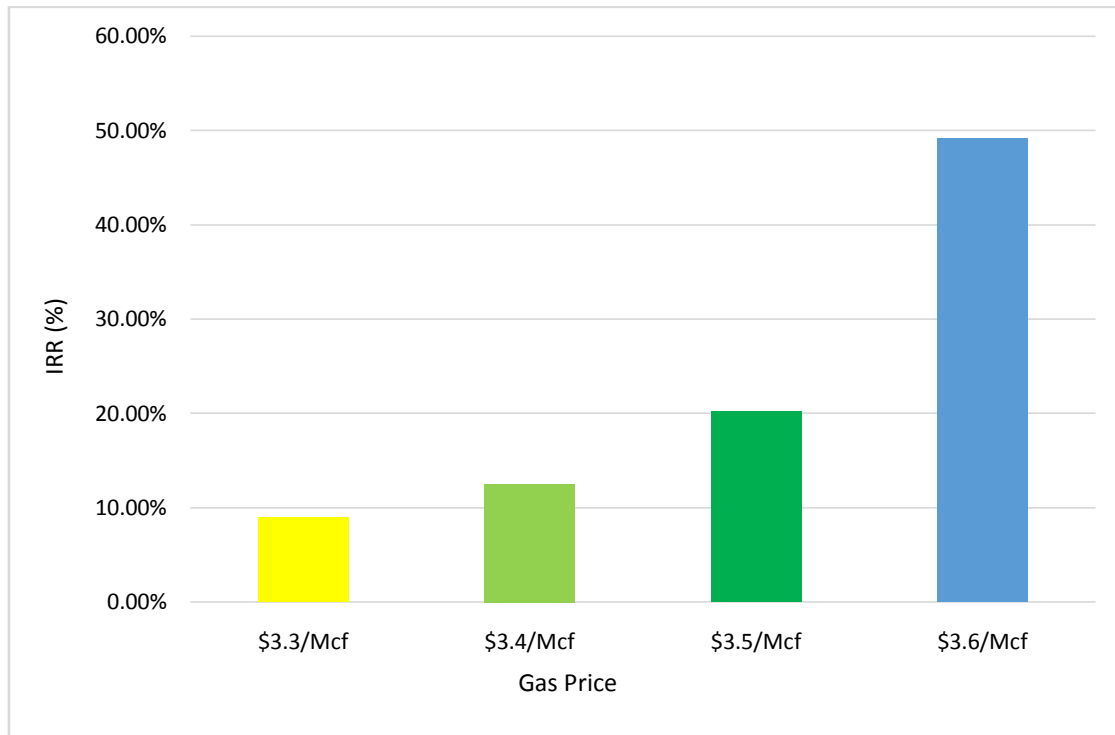


Figure 11: IRR of the gas investment using the PIA 2021 fiscal framework

#### IV. CONCLUSION

The higher the price of gas, the higher the host government NCF and contractor NCF. The host government NCF and contractor's NCF when the gas price was \$3.3/Mcf were \$1003.92 MM and \$1888.86 MM. While when the gas price was \$3.5/Mcf, the host government NCF and contractor's NCF were \$1082.86 MM and \$2045.56 MM. The contractor's NCF was higher than that of the host government NCF for every prices of gas considered. This is unlike the previous fiscal regime for oil investment in Nigeria. Usually, the host government NCF is usually higher than the contractor's NCF. This is the first time the Nigerian government is making provision for a gas investment in her fiscal system. Despite this fact, the fiscal regime for gas investment is regressive as a result of the fixed royalty rate specified for it and no tax incentives to encourage huge investment in the gas sector of the country. The higher the gas price, the more the reduction in the front-end loaded nature of the fiscal system. The higher the price of the gas, the higher the internal rate of return. The rate of return relates directly with the payout period. Both indicators are used to indicate the rate at which the contractor will recoup his cost of investment.

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