

# ANALYSIS OF ROI AND ESG IN OIL AND GAS SECTOR

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**Abstract**— ESG, encompassing Environmental, Social and governance factors, has emerged as a pivotal framework for organizations aiming to balance Sustainability and Ethical impact. Recognized by prominent firms like McKinsey, Deloitte, and KPMG, ESG's significance lies in its ability to drive financial performance, mitigate risks, and enhance reputation. This framework resonates globally, with industries like Oil and Gas, as seen in India's Directorate General of Hyderabad's report, acknowledging ESG's role in addressing climate change, environmental protection, social responsibility, and effective governance. This research narrows its focus to the Environmental dimension of ESG, delving into vital factors like Sulphur Oxide Emissions, Total Water Withdrawal, Supply Chain Environmental impact, etc. By establishing a correlation between these Environmental metrics and financial parameters, the study unveils the intricate relationship between Sustainability efforts and Economic Outcomes. In this comprehensive research, a robust methodology is employed, combining extensive data sources to analyze the Environmental facet of ESG within the oil and gas sector. A multitude of Environmental Reports sourced from Bloomberg, in conjunction with data extracted from Annual Reports, form the bedrock of Quantitative analysis. Employing a sophisticated technological toolkit encompassing Excel and Power BI, for our Research. The analytical prowess of these tools will help us in this research which aspires to catalyse a transformative shift in investment paradigms. By shedding light on the intricate interplay between Environmental factors and Financial outcomes, it empowers stakeholders to make informed, holistic and sustainable investment choices.

**Keywords**—ESG Score, Correlation, Data Visualisation, Oil and Gas Sector, Financial Parameter, ROI, Bloomberg

## I. INTRODUCTION

Environmental, Social, and Governance (ESG) principles have emerged as a prominent force in the corporate world, offering multifaceted advantages. ESG emphasizes sustainability and corporate responsibility, guiding companies to operate in ways that minimize adverse environmental impacts, promote social well-being, and uphold ethical governance practices. Beyond moral considerations, ESG has evolved into a robust risk management tool, enabling businesses to identify and mitigate environmental, social, and governance-related risks, thereby safeguarding their long-term financial viability and reputation. ESG principles also align seamlessly with the evolving expectations of stakeholders, including investors, customers, employees, and communities. As these stakeholders increasingly prioritize ESG factors, companies embracing these principles are better positioned to attract and

retain them, potentially leading to improved financial performance and heightened competitiveness.

The global regulatory landscape is undergoing transformation, with governments imposing stricter ESG-related regulations and reporting requirements. Compliance with these regulations not only ensures legal adherence but can also enhance a company's reputation while reducing the risk of fines or legal actions. Furthermore, ESG is closely tied to the concept of long-term value creation. Companies dedicated to sustainable and responsible practices often exhibit greater resilience in the face of shifting market dynamics, positioning themselves for sustained success. This commitment to ESG can confer a competitive advantage as businesses differentiate themselves through strong ESG performance, attracting more customers, investors, and top talent. Additionally, ESG is intrinsically linked to addressing pressing global challenges, such as climate change, social inequality, and ethical governance, which can significantly impact markets, supply chains, and overall business operations.

In the context of the Petroleum & Gas industry, ESG considerations have garnered heightened attention due to the sector's substantial environmental and social impacts. Oil and gas operations are well-known contributors to greenhouse gas emissions and environmental degradation, making ESG an essential framework for mitigating these challenges. The growth of ESG-focused assets in the petroleum and gas sector, from \$25 billion in 2016 to \$100 billion in 2021 according to Bloomberg NEF, underscores the industry's commitment to ESG initiatives. These initiatives encompass efforts to minimize environmental harm through emissions reduction, enhanced energy efficiency, and responsible resource extraction. Moreover, the industry grapples with social implications, including its interactions with local communities and indigenous populations. Effective ESG principles in the petroleum and gas sector emphasize responsible community engagement, the protection of human rights, and the improvement of labor practices to address these social concerns. Additionally, robust governance practices are pivotal, promoting transparent decision-making and ethical conduct in an industry susceptible to issues such as corruption and bribery.

From a commercial analysis perspective, Accounting ratios play a critical role in evaluating a company's financial health and performance, providing insights into its efficiency, profitability, liquidity, and solvency. When considering the

impact of ESG on financial outcomes, the adoption of ESG principles can yield significant and enduring effects. Research (Mercereau, Melin, & Lugo, 2022) suggests that oil and gas companies with strong ESG performance are more likely to attract and retain investors. Companies often realize reduced operational costs and increased efficiency by implementing environmentally sustainable measures and socially responsible policies. Furthermore, embracing ESG principles enhances a company's appeal to investors, facilitating access to capital, potentially lowering borrowing costs, and bolstering financial stability. The positive perception surrounding robust ESG performance also enhances a company's reputation and brand, attracting customers and investors alike, which can lead to increased sales and enhanced financial returns. ESG further serves as a potent risk mitigation strategy, averting regulatory penalties, legal liabilities, and reputational damage. Moreover, ESG encourages a long-term investment perspective, fostering stability and predictability in financial performance over time.

Regarding the effect of ESG on Return on Investment (ROI), the impact can be substantial, although not necessarily immediate. Companies that wholeheartedly embrace ESG principles often realize long-term benefits, including enhanced financial performance, a reduced risk profile, the attraction of ESG-focused investors, innovation, and adaptability. These factors collectively contribute to an amplified ROI, making ESG considerations not only a morally responsible but also financially prudent strategy for companies and investors alike.

## II. LITERATURE REVIEW

- The extractive industry, though high-tech, faces environmental challenges amid decarbonization and ESG principles. Accredited engineers are vital, with policy encompassing technical and broader skills. Sustainable goals and ESG must adapt to industry specifics. Public evaluation should consider finance, geopolitics, energy transition, and ethics. State-owned firms struggle with ESG. ESG's impact on emissions is limited. Engineers' competence is key. Proposed ISREE methodology assesses capacity and promotes ESG via stock exchanges (Litvinenko, V., Bowbrick, I., Naumov, I., & Zaitseva, Z., 2022).
- This study explores sustainability reporting's impact on Nigerian oil and gas companies' financial performance (2012-2021). It finds positive effects on Return on Capital Employed. Voluntary reporting reduces agency costs and information gaps, benefiting financial performance. Integrate sustainability into operations, introduce industry-level mandatory reporting, and create a standardized sustainability index. Sustainability reporting is vital for addressing environmental and societal impacts, enhancing financial performance through innovation, efficiency, risk management, and stakeholder engagement. ESG factors affect efficiency, with sector-specific differences. Energy and Materials sectors are highly sensitive, while Technology and Consumer sectors have lower ESG risk. Future research opportunities include individual ESG pillars, standardized assessments, threshold sensitivity, and sector-specific investigations to deepen ESG-financial performance understanding (Oosterom, J. P., & Hall, C. A., 2022).
- ESG investing rises with Millennials and Gen Z, driven by values. Includes impact, screening, and integration. U.S. regulatory changes stir controversy. Young investors to sustain ESG focus, prompting legal and political shifts. Chinese ESG growth via green finance and market opening, data reliability challenges. Complex ESG-investment return link, sector-specific impacts, governance-strength trade-offs. Financial industry adaptability crucial (Zhang, X., Zhao, X., & He, Y., 2022).
- This literature review examines sustainability in petroleum refining, focusing on Royal Dutch Shell. It covers CSR theories, sustainability models, and risk measurement. Shell's commitment to sustainability, Business Principles, and CSR policies are highlighted. Regional challenges in Nigeria and NGO criticisms are noted. Progress in emissions reduction, waste disposal challenges, social initiatives, and integrity standards are discussed. External assessments like sustainability indices and reputation rankings offer additional insights (Naimi, A., 2011).
- This research paper explores the link between CSR and EVA in the oil and gas sector post the 2010 Deepwater Horizon oil spill. It highlights the spill's role in elevating CSR and ethical considerations in the industry. The paper underscores the growing CSR focus due to incidents, media attention, and public pressure, recognizing environmental and social impacts on reputation and sustainability. It argues that the industry increasingly integrates CSR into business strategies. The study's objective is to empirically analyze the CSR-EVA relationship, guided by theoretical frameworks including instrumental, political, integrative, and ethical theories (Fomukong, J., 2014).
- ESG performance is vital due to investor, consumer, and employee demands. Research shows a mostly positive link with Corporate Financial Performance (CFP), driven by improved risk management, stakeholder appeal, lower capital costs, higher sales, and innovation. Challenges include inconsistent reporting and data costs, while opportunities include financial benefits and stakeholder attractiveness (Wanday, J., & Ajour El Zein, S., 2022).
- ESG integration in business models is complex and lacks a one-size-fits-all approach. Benefits include improved financial performance, risk reduction, better reputation, and increased employee engagement. Challenges involve reporting standardization and measuring ESG impact. Two studies explored this from SRI and SD perspectives, focusing on four ESG model elements. A knowledge gap exists in linking material ESG issues with value drivers and optimal conditions. Outcomes include

behaviors, advantages, practices, and critical views. Firms often adopt ESG due to market pressure without fully integrating sustainability. Future research should examine the empirical ESG integration process, address profitability-sustainability trade-offs, and explore ESG's impact on business models (Aldowaihi, A., Kokuryo, J., Almazyad, O., & Goi, H. C., 2022).

- This research explores ESG scores' impact on shareholder wealth in 225 Indian companies. Governance (G) factors positively affect equity returns, while environmental (E) factors have a negative impact. The paper highlights the importance of prioritizing governance practices for shareholder wealth. Portfolio managers may benefit from focusing on governance before ESG score announcements. The literature review underscores the positive effects of CSR and ESG strategies on financial performance. Limitations include the focus on Indian companies. Implications include calls for improved governance, transparency, legal reforms, and portfolio manager considerations for additional returns pre-ESG score announcements (Parikh, A., Kumari, D., Johann, M., & Mladenović, D., 2023).
- The research paper introduces a methodology for assessing corporate sustainability in the oil and gas industry. It addresses the need for new fields and private company participation, emphasizing socially responsible access to unique fields. The methodology considers occupational health and safety, environmental protection, and economic efficiency, using two indicators: a comparative index and an assessment of sustainability dynamics. The paper reviews existing assessment methods, identifies limitations, and proposes a stakeholder-based approach. It incorporates Global Reporting Initiative (GRI) standards and acknowledges the need for qualitative analysis and standardized CSR reporting. The methodology is adaptable to the mining industry. The paper highlights shortcomings in current assessment methods, emphasizing the importance of industry specifics and information disclosure (Ponomarenko, T., Marinina, O., Nevskaya, M., & Kuryakova, K., 2021).
- The literature review in the research paper "Model on Stakeholder Risks Disclosure in Corporate Reporting for Oil and Gas Companies in the Republic of Vietnam" underscores the significance of stakeholder interests in corporate reporting. It emphasizes the need for standardized, comparable, and reliable information in corporate reporting for the oil and gas industry, particularly in Russia and Vietnam. The review highlights the inadequacy of existing practices in disclosing sustainability information for making investment decisions and stresses the importance of addressing stakeholder risks. The methodology section explains that the research relies on content analysis and observations of corporate reporting practices in both countries, with a focus on the type of reports, standards, and data quality. The Global Reporting Initiative (GRI)

standards are referenced as commonly used in Russia (Kazakova, N. A., 2021).

- The literature review in the research paper "Estimation of Impact of ESG Practices' Performance and Their Disclosure on Company's Value" explores the relationship between ESG (Environmental, Social, and Governance) performance, disclosure, and firm value. It highlights a limited number of studies in this area, with most focusing on environmental aspects. There's a gap in the literature concerning the role of social and governance issues in this relationship. Some studies have examined the dichotomy between greenwashing and brownwashing strategies, while others have considered the alignment between CSR actions and claims. Notably, one study found that high environmental disclosure is more critical for market appreciation than performance, irrespective of performance levels. (Bukreeva, A., & Grishunin, S., 2023).
- This research paper investigates the impact of ESG/CSR ratings on capital costs within the global oil and gas industry. It reveals that companies with higher ESG/CSR scores enjoy lower financing expenses compared to those with lower scores. The study addresses a gap in the literature concerning industry-specific cost of capital effects in the oil and gas sector. The research employs regression analysis, utilizing data from the Refinitiv Eikon database. Regression models are constructed to analyze how ESG/CSR scores relate to equity and debt capital costs, while controlling for other influential factors. The results show that higher ESG/CSR scores are linked to reduced financing costs. While acknowledging limitations like data availability and sample size, the paper underscores the potential advantages of ESG/CSR investments for both socially responsible managers and investors. It also emphasizes the need for further research to explore causality in the ESG/CSR and capital cost relationship in the oil and gas industry. (Bjerke, J. A., 2021).
- The research paper, titled "Green Gaps," investigates the absence of standardized ESG (Environmental, Social, and Governance) investor criteria and firm disclosures, with a specific focus on assessing climate risk within oil and gas companies. The study employs qualitative content analysis to evaluate sustainability reports of selected firms. Key findings emphasize the pivotal role of investors in promoting ESG performance and the necessity for transparent reporting of sustainable business practices. The paper delves into the adoption of reporting frameworks and the integration of sustainability strategies in the oil and gas sector. Additionally, it examines how financial institutions assess and manage climate-related risks within their portfolios, including the use of disclosure requirements and metrics. The research underscores the significance of oil and gas companies demonstrating strategic commitment to

addressing climate change risks and the importance of clear communication from top executives, including CEOs. In conclusion, the paper highlights that investor ESG demands have amplified the importance of sustainability reporting and climate risk management. Neglecting these aspects can impede a company's access to capital. The study acknowledges sample size limitations and suggests future research for broader applicability and longitudinal analysis.(Dye, J., McKinnon, M., & Van der Byl, C.,2021). The EEI (Edison Electric Institute) and the American Gas Association (AGA) have joined forces to integrate natural gas operational metrics into their ESG (Environmental, Social, Governance) and sustainability reporting template. This collaboration aims to enhance consistency and transparency in reporting, providing the financial sector with standardized data. Energy companies, particularly those involved in natural gas distribution, will soon publish their ESG/sustainability data using this updated template. The EEI and AGA intend to further refine these metrics and fully integrate them into the next template version.

### III. RESEARCH METHODOLOGY

Our research methodology encompassed a comprehensive review of existing research papers and articles to establish a strong theoretical foundation. Additionally, we collected data from reliable sources, particularly Bloomberg, focusing on various companies within the oil and gas sector, including entities like Reliance, Adani Energy and GAIL. Our data extraction process involved retrieving information related to different variables within the Environmental, Social, and Governance (ESG) framework, as well as financial aspects. Notably, we leveraged Microsoft Excel as the primary analytical tool, ensuring accuracy and efficiency in our data analysis. We applied correlation analysis to investigate the statistical relationship between the specific Environmental factors of ESG and financial metrics. Correlation analysis enabled us to quantify the strength and direction of any associations, offering valuable insights into how environmental performance may impact financial performance within the oil and gas sector. Our research methodology integrated a combination of quantitative techniques and secondary data analysis to achieve a comprehensive assessment of the research problem. By rigorously following this approach, we aimed to contribute meaningful insights to the discourse surrounding the integration of ESG considerations and financial performance in the oil and gas industry, ultimately enriching our understanding of the sector's sustainability dynamics.

### IV. DATA ANALYSIS

#### Quantitative Analysis

Correlation is a Statistical tool that quantifies the extent to which 2 variables are Related. It indicates whether a change in one Variable is accompanied by a consistent change in another. It ranges from 1 (perfect negative correlation) to 1 (perfect positive correlation). Correlation is being used in our Research topic "Analysis of ESG in Oil & Gas Sector" to identify relationships between environmental disclosure and environmental performance metrics. For example, we can use correlation to determine whether companies with higher environmental disclosure scores tend to have lower GHG emissions.

|                                | Reliance     | GAIL         | Adani        |
|--------------------------------|--------------|--------------|--------------|
| Environmental Disclosure Score | 1            | 1            | 1            |
| Return on Common Equity        | 0.522123318  | 0.057283572  | 0.360499243  |
| Return on Assets               | 0.605062872  | 0.327736677  | 0.486172967  |
| Return on Capital              | 0.58097614   | 0.356551739  | 0.373493702  |
| Return on Invested Capital     | 0.022818302  | 0.252779516  | -0.033527828 |
| EBITDA Margin                  | -0.14167723  | 0.264397822  | 0.06387451   |
| Operating Margin               | -0.126367977 | 0.208520881  | 0.033703283  |
| Incremental Operating Margin   | -0.138780788 | 0.451646348  | 0.344745674  |
| Pretax Margin                  | 0.108013277  | 0.395898248  | 0.561046521  |
| Income before XO Margin        | -0.009310341 | 0.379608506  | 0.492149957  |
| Net Income Margin              | 0.048018019  | 0.37870246   | 0.492149957  |
| Net Income to Common Margin    | 0.048018019  | 0.37870246   | 0.463884723  |
| Effective Tax Rate             | 0.240198329  | -0.31159841  |              |
| Dvd Payout Ratio               | 0.227733429  | 0.540291602  |              |
| Sustainable Growth Rate        | 0.517637381  | -0.206579716 |              |

Fig. 1 Correlation Matrix of Financial Parameters with EDS

In our Research, we used Correlation to:

- Identify companies that are leading the way in ESG performance.
- Identify companies that need to improve their ESG performance.
- Understand the factors that are driving ESG performance.
- Develop strategies to improve ESG performance.

#### Data Visualisation

Power BI is a Data Analysis tool, that helps organizations collect, analyse and visualize data. Power BI can be used by organizations of all sizes, from small businesses to large enterprises.

In the case of Adani, there were notable fluctuations in their Environmental Disclosure Score (EDS) and Return on Investment (ROI) during the specified years. In the fiscal year 2016-17, EDS saw an increase, but ROI experienced a significant decline. Moving into 2017-18, both EDS and ROI increased proportionally. In the subsequent year, 2018-19, both EDS and ROI remained constant. However, in the year 2019-20, EDS increased while ROI decreased.

Post-2020, there was a positive trend where EDS continued to rise, and ROI exhibited a consistent upward trajectory. This rapid increase in ROI over the past two years allowed it to recover from its previous decline.

Regarding GAIL, there was a consistent rise in their Environmental Disclosure Score (EDS) along with a corresponding increase in Return on Investment (ROI), except for the fiscal year 2020-21 when ROI experienced a decline. EDS displayed minor fluctuations, but since 2019, it has remained relatively stable.

Notably, the Sustainable Growth Rate (SGR) and ROI demonstrated a parallel pattern on the graph. In 2016, both SGR and ROI increased in tandem, and in 2021, they both declined. Post-2021, SGR rose, resulting in a subsequent increase in ROI. This illustrates a direct and proportional relationship between SGR and ROI in the context of GAIL. In the context of Reliance, there is a noticeable alignment in the movements of Environmental Disclosure Score (EDS),

Sustainable Growth Rate (SGR), and Return on Investment (ROI) on the graph. However, there was an abrupt decline in ROI during the fiscal year 2020-21, followed by a subsequent recovery. This suggests that, overall, EDS, SGR, and ROI are moving in proportion to each other within the context of Reliance.

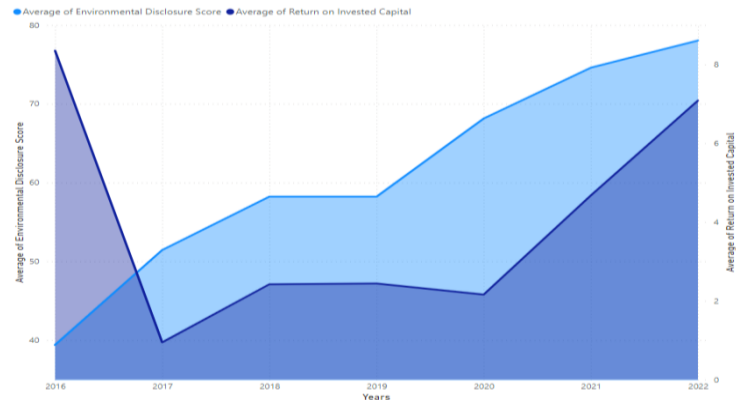


Fig. 2 Yearly Analysis of EDS & Return on Invested Capital at Adani

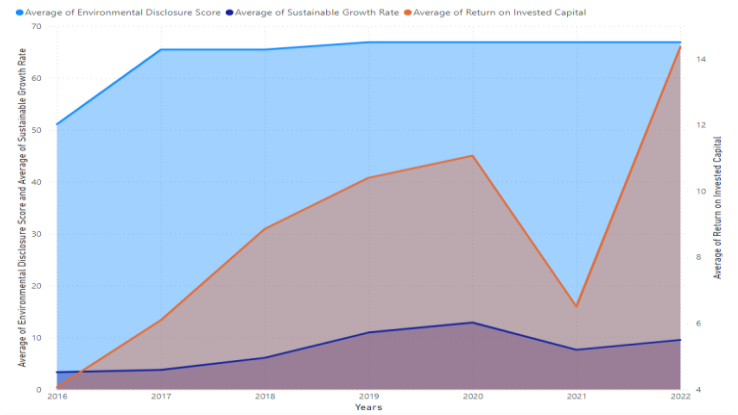


Fig. 3 Yearly Analysis of EDS, Sustainable Growth Rate & Return on Invested Capital at GAIL

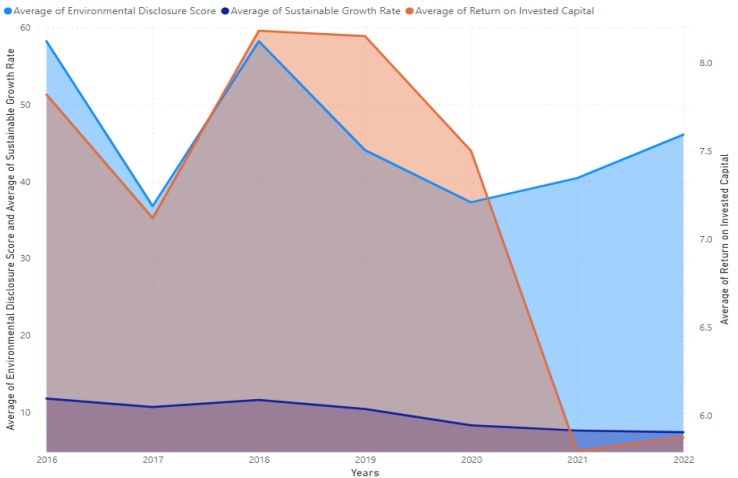


Fig. 4 Yearly Analysis of EDS, Sustainable Growth Rate & Return on Invested Capital at Reliance

## RESULTS & DISCUSSION

- A correlation of 0.522 between the environmental disclosure score and ROCE for Reliance Industries indicates a moderate positive relationship. A correlation of 0.573 between the environmental disclosure score and ROCE for GAIL indicates a moderate positive relationship. A correlation of 0.3605 between the environmental disclosure score and ROCE for Adani Power indicates a weak positive relationship. If the Investor is concerned about environmental sustainability, then Reliance Industries and GAIL may be better options.
- The correlation between EDS and Return on Assets (ROA) is positive for all three companies: Reliance Industries (0.605), GAIL (0.327), and Adani Power (0.586). This means that companies with higher environmental disclosure scores tend to have higher ROA. Based on the correlation between environmental disclosure score and return on assets (ROA), I would suggest Reliance Industries as the better company. This is because Reliance has the strongest correlation between environmental disclosure score and ROA, suggesting that it may be benefiting the most from disclosing more information about its sustainable performance.
- The correlation between environmental disclosure score and return on capital (ROC) is positive for all three companies: Reliance Industries (0.5809), GAIL (0.356), and Adani Power (0.373). This means that companies with higher environmental disclosure scores tend to have higher ROC. Based on the correlation between EDS and Return on Capital (ROC), I would suggest Reliance as the better company. This is because it has the strongest correlation between environmental disclosure score and ROC, suggesting that it may be benefiting the most from disclosing more information about its environmental performance.
- Based on the correlation between EDS and Return on Invested Capital (ROIC), I would suggest GAIL as the better company. This is because it has the strongest correlation between environmental disclosure score and ROIC, suggesting that it may be benefiting the most from disclosing more information about its environmental performance.
- Based on the correlation between EDS and return on EBITDA margin (ROEBIDM), I would suggest Reliance Industries as the better company. This is because Reliance Industries has a weak positive correlation between environmental disclosure score and ROEBIDM, suggesting that it may be able to achieve both environmental sustainability and profitability.
- It is difficult to say definitively which company is better based on the correlation between EDS and Operating Margin alone. GAIL and Adani Power have Positive correlations, while Reliance Industries has a weak negative correlation. Based on the correlation between environmental disclosure score and operating margin (OM), I would suggest that GAIL is a better company than Others.
- A correlation of 0.5176 between EDS and sustainable growth rate (SGR) for Reliance Industries indicates a moderate positive relationship, whereas GAIL indicates a Negative Correlation. A positive correlation between environmental disclosure score and SGR suggests that there may be some benefits to companies that disclose more information about their environmental performance. These benefits could include increased efficiency, reduced costs, and improved customer satisfaction.
- The negative correlation between EDS and total GHG emissions for Reliance Industries suggests that this company may be doing a good job of reducing its environmental impact. The positive correlation between environmental disclosure and total GHG emissions for GAIL and Adani suggests that this company may be investing in environmental initiatives, but that these initiatives may not be having a significant impact on its total GHG emissions.
- However, the negative correlation between environmental disclosure and total energy consumption for Reliance Industries suggests that this company may be doing a good job of reducing its energy consumption. The positive correlation between environmental disclosure and total energy consumption for GAIL and Adani suggests that this company may be investing in environmental initiatives, but that these initiatives may not be having a significant impact on its total energy consumption. The weak positive correlation between environmental disclosure and total energy consumption for Adani suggests that this company may be taking some steps to reduce its energy consumption, but that these steps may not be having a significant impact yet. The Strong Positive Correlation for GAIL suggests that the steps taken by the company to reduce its Energy Consumption, is hardly making any difference.
- The correlation between EDS and Total Water Usage is negative for Reliance Industries (-0.4022), GAIL (-0.84), and Adani (-0.44883). The correlation between environmental disclosure and total water usage is negative for all three companies. This suggests that companies with higher EDS scores to have lower total water usage. Hence, GAIL is doing the best job of reducing its water consumption.



## V. CONCLUSION

- Based on the analysis, I recommend that investors consider investing in Reliance Industries. This recommendation is based on the strong positive correlation between Reliance Industries' environmental disclosure score and sustainable growth rate (SGR), suggesting that the company benefits from disclosing environmental information. Additionally, there is a moderate positive correlation between the environmental disclosure score and net income margin (NIM), indicating that Reliance Industries may achieve both environmental sustainability and profitability. However, it's pivotal to remember that correlation does not imply causation, and other influencing factors should be considered, including financial performance, management, and industry outlook. Nonetheless, based on this analysis, Reliance Industries appears to be the most attractive investment option among the three companies for investors.
- Based on the correlation between environmental disclosure and GHG emissions, Energy Consumption and Water Usage, I would suggest Reliance Industries to investors to invest in. Reliance Industries has a strong negative correlation between environmental disclosure and GHG emissions, a moderate negative correlation between environmental disclosure and energy consumption, and a moderate negative correlation between environmental disclosure and water usage. This suggests that **Reliance Industries** is doing a good job of reducing its environmental impact across all three metrics.

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