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Valuation complexities in the energy transition: A comparative study of traditional vs. Green Energy Firms in M&A Transactions

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Abstract

Mergers and acquisitions (M&A) valuation has undergone a dramatic shift in the global energy transition, particularly as the industry transforms from a conventional hydrocarbon-based epoch to clean or green energy paradigms. Compared the complexities of valuations in M&A transactions as they relate to conventional vs. green energy firms. One of the shortcomings of traditional valuation methodologies such as Discounted Cash Flow (DCF) and market multiples is their inability to fully value green energy companies with heavy emphasis on intangible assets, policy sensitivity, and uncertain future cash flow. The study reveals the advantages of scenario-based DCF, real options analysis, and ESG-adjusted metrics for valuing renewable energy. The research also further investigates the impact of environmental, social, and governance (ESG) factors, as well as intangible assets like patents and regulatory licenses, on firm valuations and investment choices. Utilizing qualitative case studies and thematic analysis, the research emphasizes progression in M&A in both sectors, demonstrating a significant dichotomy between resource control in traditional firms versus innovation acquisition in green firms. This suggests that analysts and investors need better tools to understand the evolving energy market, which can be achieved through hybrid models based on both insight from the economics of investing in the market as well as in the broader environment of regulation and sustainability.

Keywords: Acquisitions; Complexities; Energy; Mergers; Valuations; Transition

1. Introduction

Currently, the global energy sector is transformational due to the likelihood of climate change, changes in the regulatory environment, investors' requests for sustainability, and advanced technology. Adewumi et al. (2024) sates that this shift from fossil fuels to low-carbon and renewable energy sources has brought about new dynamics in the M&A, particularly in the valuation of energy firms in the transaction. Historically, I&G companies led the M&A transactions and were backed up by their large-cap equipment, specific cash flows, and capital-intensive operations (Nguyen, 2021). These characteristics made them suitable for employing conventional models in Valuations such as Discounted Cash Flow (DCF) and the Various Multiple Models.

Notably, Lin and an (2021) posits that the emergence of new oil production forms, such as green energy forms, such as solar, wind, carbon capture, and storage, has taken a new approach to determining the valuations. These organizations have relatively low interest in tangible assets, unpredictable regulation, and innovative growth strategies that make financial predictions somewhat unpredictable. Therefore, applying the conventional valuation methods could thus not be effective in pulling out a full measure of their strategic and inherent values.

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This research investigates the impact of the selected valuation complexities on M&A transactions, especially in the traditional and green energy industries. It is centered on determining the effectiveness and drawbacks of standard approaches to valuation, determining the major factors that affect transaction value, and analyzing the rising prominence of ESG factors. Also, it raises the question of the role of intangible assets in green-energy transactions and how value concepts are changing. This is to enlighten the valuation practices that are accurate and relevant to the new trends in the energy industry.

Objectives

- To investigate the effectiveness and limitations of conventional valuation methodologies when applied to green energy firms
- To analyze the strategic rationales that drive M&A decisions in traditional and green energy sectors
- To critically evaluate the impact of Environmental, Social, and Governance (ESG) factors and intangible assets on M&A valuation outcomes.

2. Literature Review

In particular, Mergers &Acquisitions in the energy sector has used sound valuation methods to help in the decision-making process, strategic planning, investment, and the whole process of merging/acquiring the two entities (Acasio, 2023). This remains the basis of any M&A deal as it forms a link between the strategy and financial operation by assessing the value of a target firm. Among the most popular methods used in this domain, two can be distinguished: the Discounted Cash Flow (DCF) and market multiples. Although these approaches are commonly used in defined specific industries such as traditional oil and gas, where assets play the central role, their application to green energy companies and their sources of value faces some challenges.

Based on the theory of the time value of money, the DCF model aims to determine free cash flows in the future and discounts them to their present values using the appropriate cost of capital (Brezas, 2022). It is particularly suitable with the traditional players in the energy sector, characterized by long-life physical infrastructure, relatively stable operating cash flow, and mainly total risk. According to Shang (2021), establishing industries with high tangible assets and consistent earnings, DCF is suitable for industries because of the credibility and accuracy of the forecasting. For oil and gas firms, for instance, the future annual revenue flows are calculated using the formula of proved reserves, proved producing reserves, yearly production rates, and expected long-term oil and gas prices.

However, Zhang and Kong (2022) green energy firms differ from traditional firms in several ways with a definitive challenge. These firms are mainly found in industries with high regulatory risk and low historical performance and place a business focus on fast growth in developing markets. Mendes et al. (2022) opine that inherent systems of DCF are irrelevant to such firms if not for the integration of scenario-based forecast methods. Some green energy investment avenues are highly policy sensitive, rely heavily on markets for carbon credits, and are technology-funded, where optionality and variability of future cash flows are expected. Scenario-based DCF ascertains a wide range of possible values that may come with the firm's policies, markets, and technologies by conducting sensitivity analyses; all these form part of the definitude as a sub-type of DCF.

Therefore, firms in the green sector face some peculiarities, such as the structure of revenues, most of which result from specific projects and are usually with extended time horizons. For instance, cash flows from solar and wind projects are earned from the Power Purchase Agreement, lasting 15–25 years, with a structure normally pegged on regulatory support. These causes introduce long-term certainty but bear three significant risks, namely, political and other economic changes. Unlike the traditional DCF approaches, there are straight-line positive or negative outcomes with no compromise. Therefore, as the option to hold an asset with an option value and its associated risks becomes more evident, advanced methods and techniques such as the real options analysis and Monte Carlo methods are deemed appropriate for valuing the real option in renewable energy assets (Niskanen, 2022).

Market multiples are another widely-used valuation method, or more specifically, comparative or relative method. Such multiples are common ones like Enterprise Value to EBITDA (EV/EBITDA), Price to Earnings (P/E), and specific multiples like Enterprise Value to Megawatt-hour (EV/MWh). These multiples provide ease and convenience in benchmarking, especially in comparatively mature sectors with similar business models and accounting treatments. In traditional energy companies, EBIT DA is much more consistent and comparable, so the value of slot EV/EBITDA is valid. It ensures that the investors and potential acquirers can make correct assumptions and inferences from the peer group comparisons.

Nonetheless, when analyzing green energy firms, such multiples may not be as effective in providing satisfactory results. Currently, most green firms have very low or even negative EBITDA margins, especially during the first stages that require massive investments and when the revenues are not large enough and unstable. In such cases, it can provide distorted or misleading information when a company employs EV/EBITDA. According to McKinsey & Company (2021), it is evident that forward multiples Smooth with either revenue for the next year or, more commonly, adjusted EBITDA for the next twelve months, or there are growing tendencies to include ESG-adjusted measures in the value models. These metrics reflect sustainability, carbon footprint, and developmental capabilities, which provide a better understanding of firm value in an evolving energy environment.

A more significant critical factor discussed within the literature is the inculcation of Environmental, Social, and Governance components into the company's evaluation. Once, ESG considerations were deemed an additional aspect of investment decisions and not a core criterion as it is today. Wei and Zheng (2024) points of view is that ESG performance is now factored into the market value, and investor capital is shifting more toward organizations that report high-intensity sustainability. Investor activism, regulatory requirements, and societal expectations of change in the corporate world catalyze this change. Consequently, companies with low ESG scores may get lower valuations because investors consider them risky and costly, having poor access to green funding.

Although ESG is gaining weight in the current business environment and more companies are implementing ESG considerations into their activities, it is still challenging to incorporate these factors into classical valuation approaches. While both standard DCF and market multiple models have their limitations in modeling a firm's terminal value, the latter does not incorporate qualitative ESG performance or provides for handling regulatory risks of future periods (Mupa, 2024). For example, exposure to high carbon emissions may lead to increased compliance costs, legal risks, and loss of reputation, which may impact the company's cash flows and risks. However, these impacts are usually left out in most financial understanding models. To this end, two models incorporate ESG factors: the ESG-adjusted discount rates or the ESG-adjusted cash flow estimates by sustainability, carbon, or governance scores (Inard, 2023).

Furthermore, it was also realized that intangible assets have a much bigger impact on a green energy firm's valuation. Compared to traditional OGRC companies that have vested their value in tangible assets, most green energy firms draw their value from licenses, brand names, digital interfaces, proprietary trademarks, patents, and special permits. For instance, firms in the carbon capture technologies sector can possess exclusive rights to techniques that could generate enormous revenues in the future even if such potential does not reflect in the current revenues. Similarly, re-developers of RESs with good permissions or access to the grid and strong allowing bases may gain substantial premiums. However, quantifying these intangible assets is equally challenging and could be subjective, requiring real options, probability-weighted scenario analysis, or innovation-adjusted revenue multiples, as Lev and Gu (2016) recommended.

3. Methodology

This research employs a qualitative comparative case study methodology to analyze the valuation issues in energy sector M&A. The technique used in the study involves identifying particular merged/acquired companies from both conventional and green energy industries and then analyzing the kinds of valuation employed. The following sources are secondary data: the annual balance sheet and profit and loss accounts, investor relations and media publications, formal filings with regulatory bodies, and valuations by other professionals. The interpretive research approach focuses on the findings from the identified transaction structure, key assumptions, and the markets' actions.

The methodology also involves analyzing the thematic relation between strategic drivers and ESG and the impact of these factors on valuation results. This method of analysis ensures comparability of results while enabling sectors' peculiarities to be captured because different analytical frameworks are applied to each case. The content of the analysis is based on four major categories: (1) the methods of valuation, (2) things that intangible assets of a company represent, (3) the effect of ESG factors, and (4) the strategic motives of M&As.

This multi-dimensional lens provides a comprehensive understanding of the valuation landscape amid the energy transition.

3.1. Valuation Methodologies Analysis

Valuation concepts are fundamental to business, notably valuation in M&A, but existing approaches are under pressure from the differences between the old economy and green energy companies (Ray,2022). Traditional firms have the backing of well-known valuation norms. DCF analysis honoring predictable cash flows and terminal value in leveraged

buyouts is particularly appropriate for firms with endowed reserves and infrastructure. Industry averages typically apply market multiples like EV/EBITDA and P/E.

Nevertheless, Cravo (2023) states that these models must be applied with modifications to the green energy firms. Concerning the methods, DCF valuation has unstable cash flow problems due to technological variables, policy changes, and new demand. To estimate WACC, the discount rate often needs to be increased due to the higher risk specific to the projects; in the terminal value, the effect of the new regulation and climate policy scenarios must be considered. Sensitivity analysis and Monte Carlo simulations can generate more accurate forecasts under different assumptions (Ginocchi, 2021).

Market multiples also face constraints. In its early stages, a green firm may not be profitable, so the EV/EBITDA multiple is ineffective. Whereas values like forward PE, forward PEG, or earlier trailing multiples such as P/B, P/S, P/CfS, etc., remain less appropriate unless a team with ESG-adjusted multiples like EV/Revenue or EV/MW is installed. Real options analysis sometimes captures the value of technology roll-up and future policies.

The use of ESG factors in valuation has become very important in recent years. According to Banel et al. (2021) Most existing business valuation methods do not consider sustainability issues associated with certain risks or opportunities. For instance, with DCF models, the organization may provide no breakdown of the carbon pricing impacts, regulatory fines, or the influence resulting from investor inflows due to their firm's ESG status. An efficient green firm should obtain better ESG scores than its competitors, thus suggesting that the firm may attain a lower cost of capital, which in turn boosts present value. On the other hand, in the context of litigation or environmental risks, the traditional firm will experience the effect of discounts (Mupa, 2024). To address it, valuation models must incorporate ESG risk adjustments and develop climatic sensitization to evaluate exposures.

3.2. Strategic Drivers and ESG Impact

The strategic intents behind M&A operations affect the idea of valuation in a significant way. In the traditional context of energy, M&A is motivated by substantial risks, control of resources, and the market. All offers are assessed in terms of synergy realization, increase in proved reserves, improvement in the infrastructure, and any other measure of value increase (Mupa, 2024). For instance, ExxonMobil's acquisition of XTO Energy was to grow the company's shale gas capacity, and a way of operating efficiently.

On the other hand, green energy M&A is constructed as strategy-motivated by the ability to access innovation, integrate innovative technologies, and respond to regulatory changes. Bidders aim to target firms that have well-developed skills in the research and development department, sustainable material, or a brand-new market that consists of renewable ingredients. An example of this approach is TotalEnergies' acquisition of Direct Energie for an increase in renewables and digital transition.

The following ESG factors have come out as sustainability's drivers and hedges. Firms across the green environment frequently tend to have valuation premia given the market's preference, favorable regulation status, and the listing within the ESG-focused indexes. The authors Prien and Gabellone (2024) also show a positive relationship between high ESG ratings and the high value of the stocks. On the other side, the traditional firms with low ESG scores may face capital flight, reduced access to sustainable finance and high cost of equity.

Sustainability-linked finance similarly exacerbates these outcomes. Green bonds and ESG-linked loans are advantageous in providing preferential rates which decrease the capital cost and increase the firm's value. Örsted's issuance of green bonds has also reduced its WACC and, consequently, the value of DCF. Laggard's ESG transitions could adversely impact the valuation competitiveness as the cost of debt and equity increases.

Also, Parry et al. (2022), the regulatory impacts like carbon taxes, emission trading, and renewable mandates vary. Feed-in tariffs, tax credits, and policies also increase the projected revenue of green firms. Despite this, it is susceptible to policy risks and therefore requires using a regulatory risk model in valuation. Traditional form businesses are pressured to increase compliance costs and may experience asset stranding, which requires valuation discounts and impairment indications (Mupa, 2024).

4. Case Studies

While there are significant differences in the valuation method across each energy M&A, Chevron's acquisition of Noble Energy in 2020 is an archetypal deal focused on asset base, integrated inventory, and cost-cutting (Hanley, 203). The

focus to assess the companies was made based on the proved hydrocarbon reserves and the future cash flow potential using conventional relativities such as DCF and EV/EBITDA.

On the other hand, the current example revealing the green paradigm is Macquarie's acquisition of Green Investment Group (GIG) assets. This was done based on the pipeline of prospective projects, regulatory risk, and sustainability issues. Policy risk-adjusted ESG premiums incorporating SB-DCFs were used to value the concept.

Iberdrola's acquisition of Aalto Power provides another example of the specifics of the green valuation (Luis, 2024). Another reason for reaching such a value was focusing not on Aalto's current cash flows but on its sophisticated development pipeline and PPAs. Regulatory scenario analysis, wind resource modeling, and carbon pricing sensitivity were used to place a value on the deal. However, the acquisition made by BP of BHP's shale assets in 2018 reverts to a conventional volume-based method that evaluated BP's scale and break-even pricing.

The Shell Company's acquisition of Sonnen presents a good example of hybrid valuation issues. Upstream reserves typically give value to Shell; however, for Sonnen's battery segment, it was necessary to evaluate churn, scalability of the technology, and overall value creation through the platform. It effectively included conventional valuation and the concept of valuation that we see being adopted by start-ups, which was a paradigm shift in the process.

5. Discussion

By comparing the change that the transition has brought, it indicates that change has prompted a new way of thinking about valuation practices. It is noteworthy that conventional approaches based on tangible resources still have relevance but are inadequate regarding the value assessment of green energy firms. This aligns with the changes defining value creation in today's energy sector, whereby factors such as intangible resources, ESG factors, and regulatory capabilities define firm value. It is, therefore, pertinent for the discussion to dig deeper into how these variables reorient the basic foundations of valuation, thereby disrupting the idolizing of financial models.

Smart rt al. (2023) posits that most incumbent firms in the traditional energy sector, mainly integrated in upstream and downstream operations, deployed asset-based valuation models. These models focus on key aspects such as the amount, availability, and cost of reserve, production, and manufacturing capability. Ved from the relative stability of future cash flows backed by investment in tangible assets and a pretty stable commodities market, Discounted Cash Flow better, known as DCF and Enterprise Value to EBITDA, EV/EBITDA methods are relevant (Aarosin et al, 2022). Thereby, the changing outlook on the contexts of operations of the global economy, particularly in the drive to decarbonate different sectors, has brought long term uncertainty into the future of traditional firms. A new creation of risks, including carbon prices, emission restrictions, and fossil fuel boycotts, combine to possibly reduce future earnings and the value of assets. Hence, relying on history and balance sheet figures may sometimes lead to concealing dangers.

Green energy companies operate in much more competitive and innovative environments, especially in solar, wind power generation, batteries, and carbon capture. Such firms often do not have large sunk investments in tangible assets like conventional utility firms and instead depend on IP, regulatory licenses, long-term contracts, such as PPAs, and brand equity. Also, green energy firms may contain project financing, and most are still under development, thus having minimum or even harmful EBITDA levels. This is a valuation challenge since many traditional multiples, such as EV/EBITDA, do not hold any significance.

This divergence also reflects the different objectives of shareholders and stakeholders of Zapata Corporation. The traditional firm's investors have traditionally valued near-term money cash flows, current yields, and a safe security for their investments. Nonetheless, such a conservative stance is gradually shifting because of climate risks, financial statements, transition risks, and reputation (Mupa, 2024). On the other hand, the investors in green energy accept fluctuation in the short term because they eye on the long-term gains, sustainable and responsible investment, and, most importantly, the policies that will be put in place to support green energy. This investor distinction is best seen in valuation metrics where green firms are trading at premiums despite short or no earnings records.

Based on these contrasting realities, M&A anchors have the task of achieving short-term financial results with more strategic positioning (Mupa, 2024). Although buying a traditional firm could increase immediate revenues, it puts the acquirer at risk of stranding assets in the long run. Purchasing a green firm has the consequences opposite of the first by diluting short-term financial performance indicators but providing much better fit of the firm to future energy structures. As such, what is needed are valuation models that capture the current value and future flexibility.

To solve these challenges, mixed approaches to valuation have risen as a viable alternative and have been defined. These models incorporate both financial methods that were previously described and strategic and sustainability aspects. Such variables can include sustainability factors in the ESG culture in ESG-adjusted DCF models, for example, by applying ESG adjustments to the cash flow estimates and the discounting rate. Real options analysis offers a method to incorporate the option value to managers in uncertain conditions—highly applicable in the green technology industry, given the regulatory change. Policy and cost scenarios can be accommodated by establishing policy trajectories and subsidy landscapes in the valuation results. These tools provide a more realistic and broader valuation of the firms in the transitioning energy industry.

In addition, public companies should work towards developing universal ESG metrics and better disclosure standards to facilitate the development of better comparing valuation and credibility (Singhania and Saini, 2023). The current ESG reporting is still discreet, and methodologies for performing the exercise are not standardized across industries and companies. This hinders the ESG risk and opportunity to be appropriately priced by investors and acquirers. Some initiatives visible now are the Task Force on Climate-related financial disclosers and 'the European Union's Corporate Sustainability Reporting Directive or the CSRD; however, the adoption of such framework is not uniform.

6. Conclusion and Recommendations

In conclusion, the implication of the valuation of traditional versus green energy firms in M&A transactions provides an understanding of the challenges and changes an energy transition globalization occasioned. Large and traditional energy companies mostly used conventional valuation models that followed the oil and gas business models reliant on tangible assets, set cash flows, and standard business models. They are backed up by large affirmed resources and long-term contracts of supply and infrastructure; hence, they are best valued by applying traditional methodologies, including DCF and market trading multiples such as EV/EBITDA and P/E. Nevertheless, this has not been so stable anymore; factors such as climate regulations, investor divestment, and societal pressure to reconsider long-term value creation have become significant factors that question stakeholders' stability.

However, Green energy firms had little to forecast their future earnings trends like the stable and tangible assets on which the conventional models of valuation rely. They will, therefore, likely derive value from growth prospects, policies, tech and ESG, and projects – all factors far less concrete and stable. As such, their valuation cannot bear such a strict and historical measure to the same extent as freestanding regional banks. Hence, scenario-based DCFs, real options valuation, and ESG-integrated financial modeling are more crucial to modeling the risk and reward attached to these firms. These models enable the introduction of change in policy, technology, and the behavior of customers that define the transition to cleaner power.

At a strategic level, the motivation factors towards M&A differ between the two sectors. He explained that traditional firms use the acquisition strategy to get a large size and efficiency or to gain access to new reserves or markets. These transactions normally occur to achieve operational advantages and reduce costs. On the other hand, green energy M&A occurs primarily because of innovation capture, technology acquisition, decarbonization, and entry to new segments in the low-carbon space. These different strategic imperatives also have implications on the sorts of things that are valued in the deals. For instance, green energy firms presently have low profits, but numerous future projects or patents will have high valuations based on potential.

It is worth noting that ESG factors are fast becoming influential in decision making especially regarding valuation. Proprietary firms with low ESG ratings suffer market penalties by receiving lower multiples, higher capital costs, and limited market access. On the other hand, green firms with better alignment with ESG may be valued highly due to investors' consideration from an ESG perspective, rights to access instruments such as green bonds, and perceived by stakeholders in high esteem. However, such a differentiation based on ESG considerations is difficult to achieve. The problem of lack of clear ESG definitions, data issues and greenwashing make the application of ESG into the financial models challenging. Nevertheless, one has to notice that the trend is evident: the ESG indicators' performance is no longer an optional extra but an intrinsic part of the valuation.

Furthermore, the increased demand for sustainability-related products had a significant positive impact on the financial importance of ESG. Green firms avail cheaper capital through green bonds or ESG-linked loans; hence, they improve their WACC and increase their DCF values. Traditional companies know they are under tremendous pressure from institutional investors to provide realistic transition plans and climate risk reports. There are also changes in regulation, carbon price, reporting, and climate risk and opportunity disclosure frameworks are some factors that influence the enterprise value.

Given this landscape of tremendous change in the energy sector, the valuers, investors, analysts, and strategists must be able to adapt to such changes. Sticking to standard methodologies means asset mispricing and inattention to essential risks and opportunities. Instead, the valuation now has to be done with much more focus on the non-financial aspects. Also, it has to be capable of changing frequently in response to market and/or regulatory environment changes. Some are probabilistic models, Monte Carlo simulations, and integrated ESG-financial dashboards.

Therefore, in the process of further research and practical implementation, more work should be devoted to creating hybrid valuation methods that combine the features of the quantitive and strategic approaches. They should also be able to consider both – financial and non-financial factors and the dynamics of sustainability and provide a link between conventional and sustainable investments. Finally, valuation is an analytical calculation and a vital activity that speaks to the firm's management of the energy transition period

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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