

**RENEWABLE ENERGY: RISK, REPORTING, AND THE ROLE OF ACCOUNTANTS****Mador Qosimov**Student of Tashkent State University of Economics  
[madorkasimov19@gmail.com](mailto:madorkasimov19@gmail.com)**Abstract**

Unpredictable fossil fuel prices and rising climate risk make renewable energy an environmental imperative but increasingly a smart business strategy. This paper addresses the economic case for renewable energy from the risk management, reporting, and evolving role of the accountancy profession perspective. We conducted a systematic literature review of peer-reviewed articles, industry reports, and regulatory policies. It is illustrated that volatility of fossil fuel prices (most significantly oil price volatility) greatly minimizes profit margins as well as contributes to operational costs. In contrast, renewable technology (wind, solar, etc.) has witnessed dramatic drops in costs (solar PV LCOE declined 88% since 2009) and is predicted to double the generation output within five years. Renewables flatten input expenses (no fuel price risk) and cap "stranded asset" losses, valued by analysts at more than US\$1 trillion of upstream oil and gas under plausible climate policies. Moreover, the empirical literature is extensive and repeatedly discovers a positive or zero relationship between strong ESG performance (e.g., use of clean energy) and returns. To all of these trends, regulatory frameworks (IFRS S1/S2) are responding by stepping up sustainability reporting, and increasingly, firms are seeking third-party assurance of ESG disclosures. Accountants, with their expertise in financial control and assurance, are well positioned to drive forward the measurement of climate-related risks (e.g., emissions accounting) and the integration of sustainability into financial decision-making. Lastly, the transition to renewable energy can strengthen firm finances by mitigating cost volatility and long-term climate risk, and accountants will play a key role in quantifying and reporting these financial benefits.

**Keywords:** Renewable energy, financial risk, sustainability reporting, ESG, stranded assets, accountants, climate policy.

**Аннотация**

Непредсказуемые цены на ископаемое топливо и растущий климатический риск делают возобновляемые источники энергии экологическим императивом, но все более умной бизнес-стратегией. В данной работе рассматривается экономический случай возобновляемой энергетики с точки зрения управления рисками, отчетности и развивающейся роли профессии бухгалтера. Мы провели систематический литературный обзор рецензируемых статей, отраслевых отчетов и нормативной политики. Было показано, что волатильность цен на ископаемое топливо (в первую очередь, волатильность цен на нефть) значительно минимизирует маржу прибыли и способствует операционным расходам. В отличие от этого, возобновляемые технологии (ветер, солнце и т.д.) стали свидетелями резкого снижения затрат (солнечная ПВ LCOE снизилась на 88% с 2009 года) и, как прогнозируется, удвоят выпуск генерации в течение пяти лет. Возобновляемые источники энергии смягчают затраты на входные ресурсы (без риска цены на топливо) и покрывают потери "независимых активов," которые аналитики оценивают в более чем 1 триллион долларов США до поступления нефти и газа в рамках разумной климатической

политики. Более того, эмпирическая литература обширна и неоднократно выявляет положительную или нулевую взаимосвязь между высокой эффективностью ESG (например, использование чистой энергии) и отдачей. В ответ на все эти тенденции нормативные рамки (МСФО S1/S2) реагируют на повышение уровня отчетности об устойчивом развитии, и все чаще фирмы ищут стороннего обеспечения раскрытия информации об ESG. Бухгалтеры, обладающие экспертизой в области финансового контроля и обеспечения, хорошо подготовлены для дальнейшего измерения рисков, связанных с изменением климата (например, учет выбросов), и интеграции устойчивости в процессы принятия финансовых решений. Наконец, переход на возобновляемую энергетику может укрепить финансы компаний за счет снижения волатильности затрат и долгосрочного климатического риска, и бухгалтеры будут играть ключевую роль в количественном измерении и отчетности об этих финансовых выгодах.

### Introduction

Energy markets have been transformed by two converging forces: commodity price instability and the imperative to address climate change. Historic oil shocks and geopolitical disruptions have shown how volatile fossil fuel costs can erode corporate profits and burden national economies. Indeed, increased oil price uncertainty has been empirically shown to depress corporate profitability and inflate operating expenses. Firms that rely on oil for production or transportation must continually hedge against price swings, tying up cash in inventory or derivatives and diminishing financial performance.

In this context, renewable energy emerges as a strategy for financial stability: renewable sources (wind, solar, etc.) have essentially zero marginal fuel cost and are unaffected by oil supply shocks. The rapid technological improvement in renewables has drastically reduced their costs in recent years. As a result, utilities and corporations now invest in solar and wind projects not only for environmental reasons but because these assets offer more predictable operating costs and hedge against carbon-related regulatory risks.

At the same time, investors and regulators are paying unprecedented attention to climate-related financial risks. Notably, global financial institutions warn of a potential wave of “stranded assets” if climate policies tighten: analysis suggests that more than US\$1 trillion of oil and gas resources could become unprofitable under plausible climate scenarios. Since many investors (especially in OECD countries) are exposed to fossil fuel companies, this creates systemic risk for portfolios and pension funds. Conversely, companies that transition to renewable energy can reduce this stranded-asset exposure. Moreover, a growing body of research finds that strong environmental, social and governance (ESG) performance – often tied to clean energy adoption – is positively associated with financial performance. In other words, the “business case” for sustainability is well-supported by evidence.

These trends are driving changes in reporting and accounting. Global standards setters (like the IFRS Foundation) have introduced comprehensive sustainability disclosure requirements (IFRS S1 and S2) to ensure investors get consistent data on climate risk and energy strategy. Regulators and stock exchanges are moving toward mandatory ESG reporting, and companies are increasingly obtaining independent assurance of sustainability data. This evolution elevates the role of accountants and auditors: they are called upon to integrate climate-related metrics (carbon emissions, energy usage) into financial statements and to

assure the reliability of those disclosures. Accountants' expertise in financial controls and risk assessment positions them to guide the corporate transition to low-carbon energy.

This paper explores the financial case for renewable energy - namely, how shifting from fossil fuels to renewables affects corporate risk and value - and examines how accounting and reporting practices must adapt. We review empirical studies and authoritative reports to answer: Does renewable energy reduce financial risk and enhance returns, and what reporting frameworks and accounting roles support this transition? The analysis will synthesize data on cost trends, risk exposures, and performance metrics, and it will identify the implications for corporate reporting. In doing so, we aim to inform business leaders and accountants about the tangible financial benefits of renewable investments and the transparency measures needed to capture them.

### Literature Review

**Fossil Fuel Price Risk.** Volatility in oil and gas prices creates significant financial uncertainty for companies. Empirical research consistently finds that oil price unpredictability hurts corporate earnings and raises costs. For example, Vuong and others (2024) show that higher oil price uncertainty significantly reduces Chinese firms' profitability and simultaneously increases their operating expenses. This effect is especially pronounced for smaller or oil-dependent firms. Analogous studies in other markets (the US, GCC) also report a negative correlation between oil price shocks and firm profits. High volatility forces companies to allocate cash toward hedging instruments, build excess inventories, or dynamically adjust capital spending, all of which introduce additional financial costs and complexity. Moreover, attempts to forecast oil prices have proven unreliable: long-term forecasts by agencies like OPEC, IEA, and EIA often diverge, underscoring that market dynamics are inherently uncertain. In summary, the literature identifies oil price volatility as a significant macroeconomic risk that can cascade through supply chains and corporate budgets, reducing cash flows and investment.

**Stranded Assets and Climate Risk.** Beyond commodity volatility, the energy transition introduces structural risks for investors. A key concept is "stranded assets" – fossil fuel reserves and infrastructure whose value is lost when climate policies or market shifts render them obsolete. A recent Nature Climate Change analysis estimated that the present value of stranded upstream oil and gas assets could exceed US\$1 trillion under realistic carbon-constrained scenarios. Importantly, the bulk of this exposure falls on investors and pension funds in advanced economies. The study finds an international net transfer of over 15% of global stranded-asset risk onto OECD-based investors, implying that financial institutions in rich countries may face severe write-downs if demand for fossil fuels contracts. This creates a systemic threat, sometimes likened to a "fossil subprime" scenario, in which widespread devaluation of carbon-intensive assets disrupts the financial system. Analysts warn that banks and insurers heavily invested in fossil fuel firms could suffer large losses, with knock-on effects on lending and markets. Thus, preventing stranded asset losses by diversifying into renewables is framed as a prudent financial strategy. In sum, the literature emphasizes that climate-related transition risk is becoming material – equivalent to other macroeconomic shocks – and that renewable alternatives help insurers protect balance sheets from this risk.

**Renewable Energy Economics.** In contrast to fossil fuels, renewable technologies exhibit learning-curve effects and decoupling from fuel price risk. The cost of solar and wind power has fallen dramatically: data show that utility-scale solar PV's levelized cost of electricity

(LCOE) dropped by 88% between 2009 and 2024. Wind power costs have also plummeted due to larger turbines and economies of scale. As Roser (2024) notes, in many regions new wind or solar plants are now cheaper to build and run than new coal or gas plants. These cost declines are a result of each doubling of installed capacity yielding roughly a 20% cost reduction for solar. Consequently, renewables are rapidly scaling: by 2019, 72% of new global power generation capacity came from renewable sources. Projections by the International Energy Agency (IEA) similarly indicate explosive growth – renewable electricity capacity is expected to expand by ~75% from 2022 to 2027, an acceleration driven in part by high fossil fuel prices that make green projects more attractive. In fact, the IEA forecasts that renewables (led by wind and solar) will become the largest source of global electricity by the mid-2020s, rising to about 38% of generation by 2027. This literature underlines that, unlike fossil generation, renewables deliver electricity with predictable (and declining) costs, improving long-term budgeting and reducing exposure to commodity swings. ESG Performance and Financial Returns. A large meta-analysis of over 2,000 empirical studies concludes that firms with strong environmental, social and governance (ESG) performance tend to have equal or higher financial returns than low-ESG peers. Friede and others (2015) report that roughly 90% of examined studies find a non-negative link between ESG and corporate financial performance, with the majority showing a positive effect. This means that investing in cleaner energy and sustainable practices often does not entail sacrificing profitability; in many cases, it yields cost savings, reputational benefits, and access to capital. For example, companies using more renewable energy may enjoy lower energy bills and hedge against future carbon taxes, which can boost margins over time. Overall, the finance literature suggests that transitioning to renewables can enhance firm value, partly through risk reduction and partly by signaling forward-looking management. These findings provide an empirical rationale for executives and accountants to consider renewables as a strategic investment.

Sustainability Reporting Standards. The shift toward renewables and climate risk has triggered new reporting requirements. Global standard-setters have recently codified principles for consistent sustainability disclosure. The ISSB (International Sustainability Standards Board) issued IFRS S1 and S2 in June 2023, defining a comprehensive, investor-oriented baseline for reporting all sustainability-related risks (S1) and specifically climate-related disclosures (S2). These standards align with the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) but go further by mandating broad sustainability metrics. Crucially, IFRS S1/S2 apply to financial periods beginning in 2024, signaling that sustainability information will soon be integrated with financial statements. Parallel initiatives like the EU's Corporate Sustainability Reporting Directive (CSRD) and jurisdictional mandates are reinforcing this trend. The upshot is a convergence towards mandatory, structured ESG reporting globally.

Nonetheless, recent surveys show that many companies still provide only limited climate risk detail. For example, the IAIS/CBIRC report (2022) notes that only a small minority of firms actually disclose the quantitative financial impact of climate change on their businesses. In practice, most disclosures focus on emissions and qualitative narratives, not on metrics like asset valuations under different climate scenarios. Accountants and auditors have recognized this gap. Industry bodies such as IFAC highlight an urgent need to build accounting competencies in sustainability; a 2024 IFAC report emphasizes that “stakeholder demand for relevant and reliable sustainability reporting” is growing, and that the

accountancy profession is working to prepare professionals to meet that demand. Likewise, an AICPA/CIMA/IFAC study finds that nearly three-quarters of large corporations now seek external assurance on their sustainability reports, with auditors preferred as providers of credibility. These developments illustrate that reporting frameworks are evolving quickly, and that accountants will play a central role in shaping how renewable energy's financial impact is measured and communicated.

### Methodology

This paper is based on a comprehensive literature review and synthesis. We searched for peer-reviewed academic articles, industry analyses, and official reports (from bodies such as the IEA, World Bank, IAIS, etc.) related to the financial and accounting aspects of the energy transition. Searches included terms like "oil price volatility corporate risk," "renewable energy financial performance," "sustainability reporting standards," and "climate accounting." We prioritized scholarly sources from journals, books, and respected institutions. The inclusion criteria were: studies addressing the financial implications of energy or climate issues (cost, risk, asset values) or the role of accounting/reporting in the transition; those providing empirical data, modeling results, or authoritative frameworks. We excluded purely opinion essays, non-English publications, and studies focusing only on technical or engineering aspects of energy.

From each selected source we extracted key findings, including quantitative estimates (cost figures, risk valuations) and qualitative insights (e.g. definitions of stranded assets, descriptions of reporting frameworks). We also took note of consensus and debate in the literature. For example, when multiple studies estimated stranded asset exposure or renewable cost trends, we compared their values. Any numerical data (such as percentage growth forecasts or return on investment figures) were noted for accuracy. We assessed the reliability of sources by checking for peer review, institutional authority, and date of publication. To avoid bias, we gave particular weight to systematic reviews, meta-analyses and large-sample empirical studies.

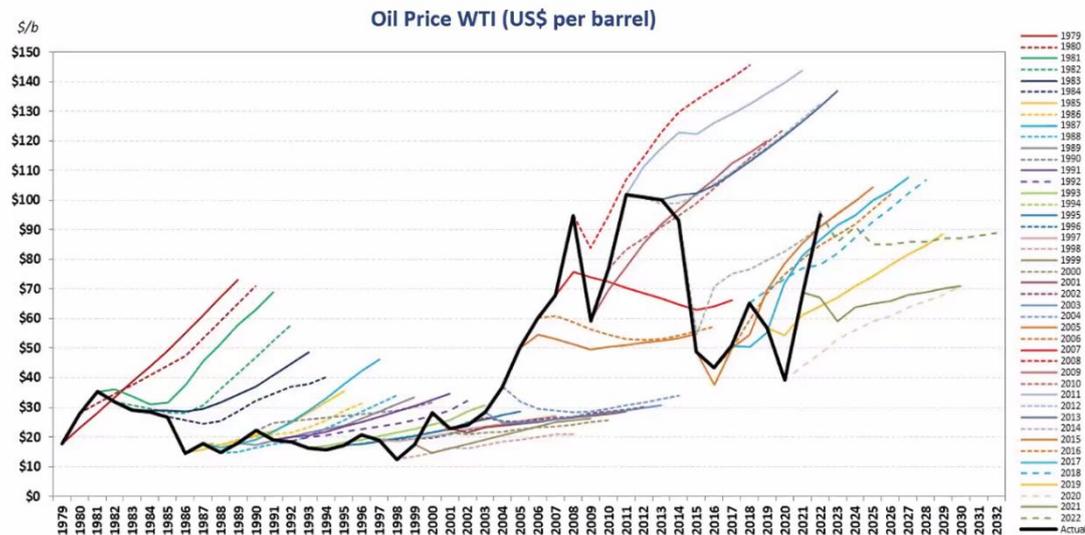
### Discussion

Fossil Fuel Risk in Corporate Finance. The vulnerability of businesses to fluctuating oil prices is well documented. High crude volatility forces companies to waste resources on defensive measures. For example, firms often accumulate large fuel inventories or buy costly derivatives to hedge price swings, which ties up capital and may backfire if prices subsequently fall. Empirical studies confirm that these costs are non-trivial. Vuong and others (2024) show that greater oil price uncertainty in China significantly reduces corporate return on assets while raising firms' operating costs. Similar results have been found in other regions, reflecting that sudden oil price shocks can dramatically squeeze profit margins.

Forecasting oil prices is notoriously difficult, making budgeting hazardous. Historical demand and supply projections (by OPEC vs. IEA) frequently diverge, underscoring uncertainty about the future energy mix. In practice, even sophisticated forecasts often underperform simple assumptions over multi-year horizons.

Very hard to predict the future...

Baker Institute Center for Energy Studies



Data Source: EIA Annual Energy Outlook.

Consequently, firms reliant on fossil energy face a “financial trilemma”: they need petroleum for production, yet lack reliable cost forecasts. Attempts to self-insure (holding extra fuel or using financial hedges) can be expensive. Studies indicate that excessive inventory holding lowers turnover and hurts liquidity; similarly, entering complex hedge contracts requires expertise and can generate losses if markets move unexpectedly. In effect, managing fossil fuel price risk can be costlier than the price volatility itself, because hedging expenses and inefficiencies offset much of the intended protection.

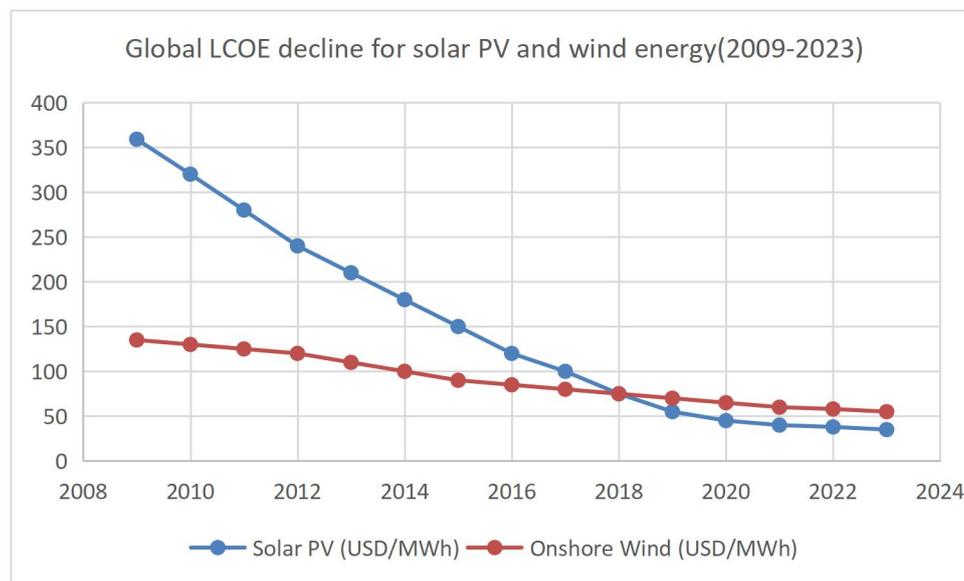
As a result, analysts argue that entrenched fossil fuel investment may pose systemic risk. One narrative warns of a “fossil subprime” scenario, comparing widespread stranded carbon assets to the 2008 mortgage crisis. In this view, interconnectedness of finance and fossil-fuel industries could transmit shocks broadly if carbon-intensive assets are devalued

Renewable Energy’s Financial Advantages. By contrast, renewable energy projects transform many of these risks into opportunities. Technologically mature sources like wind and solar entail almost zero fuel cost, removing the primary driver of price uncertainty. The economic literature documents that electricity from renewables now often costs less than new fossil generation. For example, Lazard reports and international data confirm that

utility-scale solar PV is frequently the cheapest source of new power (all-in LCOE) in many markets.

In concrete terms, an electricity producer investing in a solar farm today can largely lock in its power price (subject only to maintenance) for 20+ years. There is no commodity tie-in that could spike or collapse.

This cost stability matters for financial planning. Firms know exactly their capital outlay (fixed) and can predict revenues, which dramatically simplifies budgeting compared to, say, a coal plant whose fuel bill could double. Moreover, since renewables have seen steep



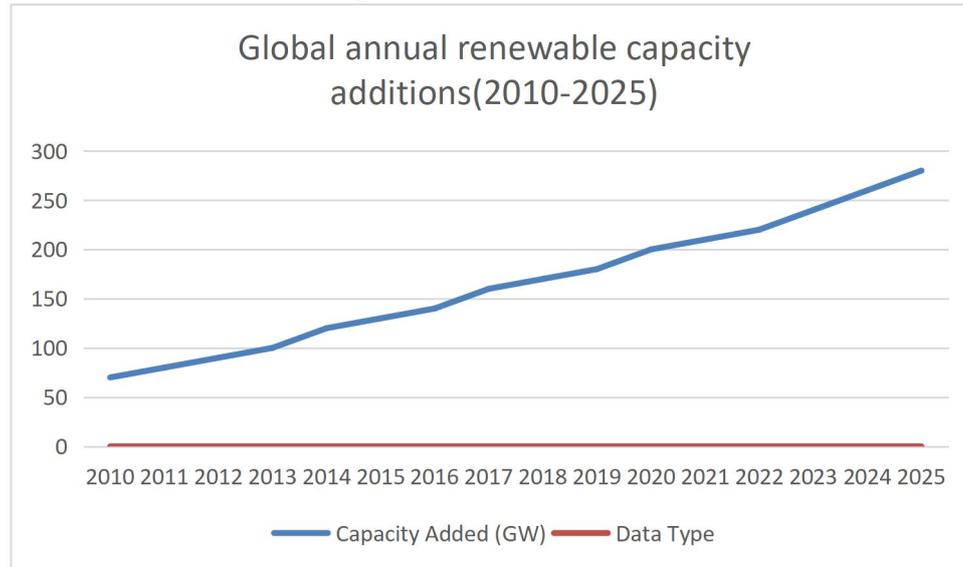
learning rates, their upfront costs continue to fall. One visualized learning curve shows that each doubling of global PV capacity has brought roughly a 20% drop in module price. The effect of this is clear: constructing a new solar power plant required charging customers ~\$496/MWh in 2009, whereas 15 years later Solar's break-even price is far below the cost of a new coal plant. These economics create a positive feedback loop: cheaper renewables spur more deployment, which drives further cost decline.

The growth trends are already striking. Renewables provided over 70% of all new electricity capacity installed worldwide in 2019. In some regions (Europe and China) renewable investments form the majority of power sector spending. International forecasts amplify this picture: the IEA's Renewables 2022 report predicts ~2400 GW of new renewable capacity

between 2022 and 2027 – roughly equal to the entire current power fleet of China.

Under these projections, wind and solar generation are set to double their market share in five years, reaching nearly 20% of global electricity by 2027 time, renewables are expected to be the single largest generation source (surpassing coal).

All of this translates into a strong return on investment for renewables. While their capital



costs can be high, projects typically operate for 25–30 years with minimal fuel expense, yielding strong cash flows after payback. In fact, as subsidies have phased out, renewables remain economically competitive simply on market terms: solar and wind are now cheaper than most legacy fuels in levelized terms. Consequently, companies adding renewable assets often see a reduction in their weighted average cost of energy (WACE), which improves profitability forecasts. Combined with the positive ESG premium found in the literature, this makes renewables an attractive strategic investment.

**Financial Metrics and Depreciation.** Accountants evaluate renewable projects similarly to other capital assets but note some distinctive features. Renewable plants have long useful lives (typically 20–30 years) and predictable output. This can justify accelerated depreciation in early years, providing tax benefits. However, their salvage value is usually low (panels/turbines have little resale on secondary markets, unlike, say, used oil rigs). Still, the overall net present value (NPV) of a renewable project tends to exceed that of an equivalent fossil plant under many scenarios, because the free fuel savings accumulate. For example, a solar farm with a moderate levelized cost can lock in power at today's rates, effectively earning a "savings" as fossil fuel prices rise. These considerations are backed by studies of cash flows and investment models (e.g., levelized cost and IRR comparisons), which consistently show renewables yielding competitive returns – often exceeding those of fossil alternatives when carbon costs are internalized.

**Accounting for Carbon Footprint.** Another financial angle is carbon accounting. Many jurisdictions will soon price carbon (through taxes or cap-and-trade), making high-emitting operations financially riskier. Renewable energy typically has near-zero direct emissions (Scope 1), and can significantly offset indirect emissions (Scope 2 and Scope 3) when used to replace fossil energy. From an accounting viewpoint, a company that reports a lower carbon footprint is exposed to less potential future cost from carbon pricing. Furthermore,

evolving standards require that firms actually quantify and disclose emissions data. For instance, new IFRS S2 standards mandate climate-related disclosures including greenhouse gas (GHG) emissions metrics, which cover Scopes 1–3. Accounting procedures must therefore be updated to track energy usage and emissions through the value chain, and to estimate any contingent liabilities (carbon tax obligations). This shift makes accountants critical in bridging engineering (energy use) data with financial reports.

**Global Reporting Frameworks.** The landscape of corporate reporting is rapidly aligning with these trends. As noted, the IFRS Sustainability Standards (S1 and S2) establish a high-quality baseline for climate and ESG disclosure. These require companies to articulate their transition strategy and quantify relevant metrics, rather than relying on voluntary or inconsistent green narratives. Importantly, S2 allows some relief during the first reporting year for scope-3 emissions (the far-reaching supply-chain impact), acknowledging practical challenges in measuring those. Nonetheless, the new regime ensures that investors get a comparable view of companies' energy choices and associated risks. Complementing IFRS, frameworks like the Task Force on Climate-related Financial Disclosures (TCFD) are being incorporated into regulation worldwide.

In practice, many companies are already moving toward integrated reporting. An IFAC/AICPA study shows that by 2023, 98% of large corporations reported some sustainability information, and 73% of them obtained external assurance on at least part of their ESG data. Auditors (including CPA firms) have claimed around 55% share of this assurance market. This is a significant shift: as Lee White (IFAC CEO) notes, boards and investors increasingly expect sustainability reports to have the same reliability as financial statements. Audit professionals' training in risk, process evaluation, and controls makes them suitable for this role. For example, Susan Coffey (AICPA/CIMA) emphasizes that auditors' rigorous methodology is ideal for verifying sustainability metrics. Thus, in the emerging regime, accountants do much more than number-crunch; they design the reporting processes that ensure a company's renewable investments and emissions are transparently reflected in financial disclosures.

*Accountants' Evolving Role.* The literature and practice both signal that accounting professionals must expand their skill set to address the energy transition. Tasks include: establishing accounting methods for renewable assets, auditing carbon footprint calculations, and advising on how climate risks affect financial statements (impairments of assets if coal plants become uncompetitive). Professional bodies are responding: a recent IFAC literature review highlights new competencies for accountants in sustainability reporting and assurance. Universities and CPA curricula are gradually integrating topics like environmental management accounting and sustainability frameworks. In the corporate office, CFOs and controllers now often have sustainability KPIs on their scorecards. For instance, many firms track internal "carbon ROI" – the avoided cost per ton of CO<sub>2</sub> by using renewables – as an internal metric. Such data feeds into investment decisions and, in turn, into narrative disclosures.

In sum, the literature depicts a transition in which renewable energy confers financial benefits (cost savings, stability, regulatory relief) while fossil fuels impose growing liabilities (price volatility, stranded asset risk, regulatory costs). Reporting frameworks are evolving to make these differences visible to investors, and accountants are the gatekeepers of that information.

## Conclusion

The assembled evidence confirms that renewable energy makes strong financial sense in today's environment of commodity uncertainty and climate policy change. Unlike fossil fuels, renewables insulate companies from volatile fuel costs – solar and wind projects have stable, predictable generation costs since their “fuel” (sunlight, wind) is free. Historical data show renewable electricity has plummeted in price (solar down ~88% since 2009) and market analysts forecast renewable share of global generation to surge past 30% by 2030. These trends translate into solid project economics: many renewable investments now yield higher returns than equivalent new coal or gas plants. Moreover, as meta-analyses demonstrate, firms with better environmental profiles (including use of clean energy) often enjoy equal or better financial performance. In short, moving to renewables reduces costs in the long run and avoids downside risks. On the risk side, burning fossil fuels exposes firms to sudden losses. Oil price shocks can decimate margins in manufacturing, transport, and power generation; furthermore, tightening climate policy threatens to strand huge fossil assets (estimated >US\$1 trillion in lost upstream oil and gas profits). Companies that do not diversify away from carbon risk owning assets that may become obsolete or heavily taxed. Conversely, renewable investments create assets that retain value in a decarbonizing world. Thus, a transition portfolio is more resilient. Our review shows that boardrooms and investors have taken note of this. They increasingly demand data on how companies manage energy and climate risk.

This leads to the reporting dimension: With global standards like IFRS S1/S2 and CSRD mandating sustainability disclosures, the future of reporting is integrated. Companies will have to report not only financial results but also how their energy strategy impacts performance and risk exposure. For example, firms must quantify greenhouse gas emissions from all activities (Scopes 1–3) and describe any climate-related losses or investments. As ISSB's IFRS S2 states, these disclosures are meant to supplement financial statements and assist investors. Our sources indicate this is more than theory – nearly three quarters of large firms now get external assurance on ESG reports, meaning auditors are verifying the data. By professional mandate, accountants are central here: they design the metrics and controls for tracking energy usage and emissions, they evaluate asset impairments (recognizing that a coal plant's value must be written down if demand falls), and they validate the completeness and consistency of sustainability notes. In other words, accounting work now covers renewable energy just as it does capital assets: depreciation schedules, cost-benefit analysis, and risk disclosures.

In answering the core question, we conclude that the financial case for renewable energy is compelling. All synthesized data point to the same message: investing in clean energy reduces volatility, fosters long-term savings, and aligns with emerging regulatory requirements, thereby enhancing shareholder value. Fossil fuel dependency, by contrast, burdens companies with unpredictable costs and potential write-downs. The role of accountants in this picture is supportive and transformative. By quantifying the costs and benefits of renewable projects, ensuring transparent climate disclosures, and providing assurance on sustainability data, accountants help make the financial logic of renewables explicit to managers, investors and regulators. This builds confidence that the shift to renewable energy not only meets environmental goals but also strengthens the economic resilience and prosperity of businesses.



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