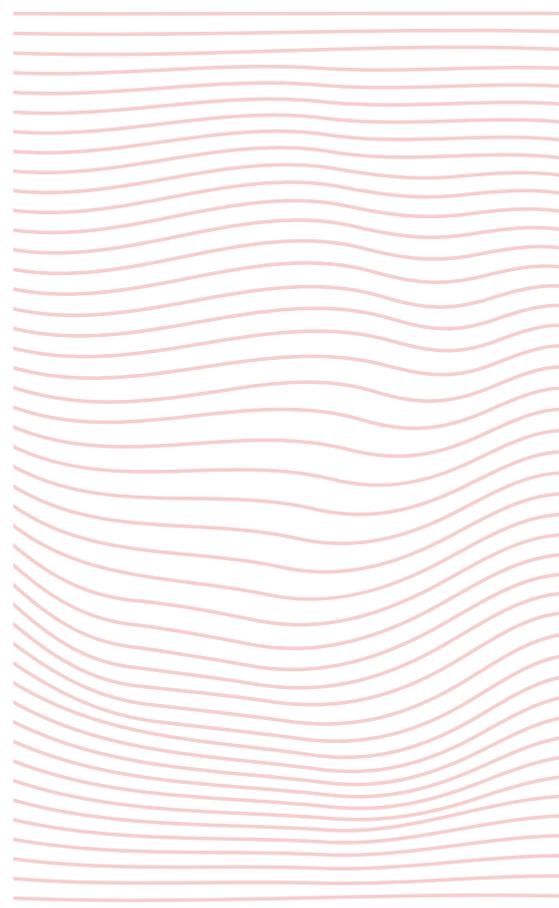




Capital Markets as Catalysts for Net Zero Targets in the Decarbonization Journey of Saudi Arabia

A White Paper



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EXECUTIVE SUMMARY

The abundance of listed Sharia-compliant companies and funds especially characterizes Saudi Arabia. This makes it, in addition to its many investment advantages, one of the most important markets in the world attracting Sharia-compliant businesses. In this paper, we emphasize the importance of sustainability in Sharia, which sets the overarching principle of “Do no harm and don’t reciprocate harm” as a general rule preventing any harm to others including all natural resources in the environment.

The white paper “Capital Markets as Catalysts for Net Zero Targets in the Decarbonization Journey of Saudi Arabia” explores the nation’s strategic response to the multifaceted challenges posed by climate change and its commitment to achieving net-zero emissions by 2060. The document delves into historical data, current initiatives, and future projections to outline the critical role of capital markets in driving Saudi Arabia’s decarbonization efforts.

Climate change significantly impacts Saudi Arabia’s environment, economy, and society. Over the past six decades, temperatures have shown significant anomalies, with projections under high emissions scenarios suggesting potential increases of up to 6.3°C by 2100. This would intensify heat-related stresses across various sectors. Precipitation patterns have been erratic, with future projections indicating significant increases in annual precipitation but also more frequent and intense droughts. Coastal regions face threats from rising sea levels, with urban areas like Jeddah and the Dammam metropolitan area particularly vulnerable to flooding and erosion. Additionally, water scarcity remains critical, with renewable freshwater resources extremely limited and projections suggesting further reductions in groundwater recharge by 2050.

Key sectors such as agriculture, health, and energy are particularly vulnerable. Agricultural yields for key crops are expected to decline, necessitating more efficient water use and alternative irrigation methods. Health impacts are evident, with rising temperatures increasing heat-related mortality and the prevalence of vector-borne diseases. The energy sector faces increased demand for cooling and significant stress due to rising temperatures, despite ambitions to generate 50% of energy from renewables by 2030.

To address these challenges, Saudi Arabia has launched several key programs under Vision 2030, focusing on economic diversification and sustainable growth. The National Transformation Program (NTP) aims to reduce dependency on oil revenues and boost non-oil commodity exports. The Public Investment Fund (PIF) Program seeks to inject substantial capital into the economy, emphasizing investments in renewable energy. The National Industrial Development and Logistics Program (NIDLP) aims to transform Saudi Arabia into a global logistics hub, leveraging energy, mining, industry, and logistics sectors. The Financial Sector Development Program (FSDP) targets significant growth in the banking sector, enhancing the stock market, and increasing SME financing. The National Renewable Energy Program (NREP) aims to establish a robust renewable energy infrastructure, targeting a capacity of 11.8 GW by 2025.

The transition to a net-zero economy necessitates a concerted effort from all components of the capital markets, including stock exchanges, investment banks, asset managers, regulatory bodies, investors, and corporate issuers. Each plays a crucial role in fostering sustainable finance, enhancing transparency, and driving investments toward environmentally and socially responsible projects. Stock exchanges facilitate the listing and trading of green and sustainability-linked financial instruments, while investment banks structure and underwrite green bonds and loans. Asset managers integrate ESG and

climate risk factors into investment decisions, and regulatory bodies enforce standards for ESG disclosures. Investors allocate capital towards sustainable investments, and corporate issuers fund projects that reduce carbon emissions and enhance sustainability.

Saudi Arabia is leveraging green bonds to finance large-scale renewable energy projects, exemplified by the PIF's green bond issuance in October 2022, which raised \$3 billion for green projects. The establishment of the Regional Voluntary Carbon Market Company (RVCMC) by PIF and the Saudi Tadawul Group facilitates carbon credit trading, supporting regional businesses in reducing emissions. This initiative aligns with Saudi Arabia's broader strategy to diversify its economy and commit to significant carbon reduction efforts.

The Saudi Stock Exchange (Tadawul) plays a pivotal role in the Kingdom's financial landscape, strategically aligning with global ESG standards. Tadawul's engagement with the United Nations' Sustainable Stock Exchanges (SSE) initiative enhances its market credibility and contributes to global sustainable finance efforts. The ESG Disclosure Guidelines from the Saudi Exchange provide a strategic framework to embed ESG principles into corporate operations and reporting, enhancing corporate transparency and attracting long-term institutional investors.

The Circular Carbon Economy (CCE) framework is a comprehensive approach to managing and reducing carbon emissions through a closed-loop system of reducing, reusing, recycling, and removing carbon. Saudi Arabia is investing in carbon capture, utilization, and storage (CCUS) technologies, and international collaborations are enhancing the effectiveness of the CCE framework.

Despite ambitious goals, Saudi Arabia faces significant challenges in achieving net-zero emissions. The reliance on unproven CCS technologies, limited progress in renewable energy, and heavy dependence on fossil fuels pose substantial hurdles. The government's strategic plans under Vision 2030, while promoting economic diversification, lack clear actionable steps to phase out fossil fuels, raising doubts about achieving net-zero emissions.

The white paper provides comprehensive recommendations for capital market participants to support Saudi Arabia's net-zero transition. These include regulatory frameworks, market mechanisms, incentive structures, capacity building, stakeholder engagement, and monitoring and reporting. Specific recommendations include phased ESG reporting requirements, the creation of an Islamic ESG Index, the implementation of an advanced carbon trading platform, and the development of a transparent carbon credit exchange. Incentives such as reduced listing fees and tax benefits are proposed to encourage green listings and investments in sustainable projects.

Additionally, the paper outlines the needs for advisory, consultation, training services and capacity-building initiatives like executive training programs and investor education on sustainable investing. The establishment of innovation hubs and collaborative platforms for developing sector-specific sustainability standards and joint projects is recommended. Monitoring and reporting frameworks with detailed KPIs and annual sustainability reports will ensure transparency and accountability.

By implementing the outlined recommendations, Saudi Arabia can enhance its resilience, attract sustainable investments, and contribute to global efforts in combating climate change. The collaborative efforts of all stakeholders, supported by robust regulatory frameworks and innovative financial mechanisms, are vital for achieving the Kingdom's long-term sustainability goals.



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ABOUT THE PUBLISHERS

About Spectreco

Spectreco is a global sustainability, technology, advisory, and implementation company.

Spectreco is your partner in building a better world, offering an innovative, data-driven approach and ready-to-deploy solutions. Backed by a century of collective expertise and a global perspective, we streamline compliance across multiple jurisdictions, with a focus on built infrastructure across industries, transforming sustainability challenges into strategic advantages for investors, businesses, and governments alike.

Spectreco is a collaboration between Spectra Holdings LLC and Sustainability LLC, USA, offering expertise in Climate Action Agendas, ESG Investing, Built Infrastructure, Investment Management, Sustainable Supply Chain, Green Financial Instruments, Technology, and Data. We work closely with governments and the private sector, engaging in various initiatives such as economic growth & investment, climate policies, financing, circular economy principles, and more. Our board brings extensive experience in strategic initiatives, investment management, and financial analysis for both public and private enterprises. With a proven track record in delivering impactful ESG solutions, we are committed to assisting businesses in achieving their sustainability goals while ensuring simplicity, compliance, and adaptability across jurisdictions.

About AlBaraka Forum for Islamic Economy

AlBaraka Forum for Islamic Economy Stands as a Leading Independent Non-Profit Global Think Tank

Founded by the visionary late Sheikh Saleh Abdullah Kamel (1941-2020) (may Allah bestow mercy on his soul), AlBaraka Forum for Islamic Economy stands as a leading independent non-profit global think tank dedicated to advancing the understanding and application of Islamic economic principles. With a legacy spanning nearly 50 years, the Forum has consistently been at the forefront of research and development in this vital industry.

The Forum aims to foster the development and promotion of Islamic economy worldwide, striving to establish a global platform for dialogue on key economic topics and serve as a knowledge hub. By nurturing future generations of experts and forging partnerships with relevant entities, AlBaraka Forum enriches the research stock of Islamic economy while aspiring to achieve global leadership ensuring it remains a beacon of knowledge in the global economic and financial arena.

CHAPTER 1

INTRODUCTION

Climate change presents a multifaceted challenge for Saudi Arabia, significantly affecting its environment, economy, and society. The rising temperatures, a primary concern, are evident from historical data showing anomalies between -1.2°C and $+2.4^{\circ}\text{C}$ over the past six decades compared to the 1961-1990 period. Projections suggest that under a low emissions scenario, temperature increases will stay below 2°C by 2050 and 2100. However, under high emissions scenarios, temperatures could surge by up to 6.3°C by 2100, potentially raising annual mean temperatures by 2.6°C by mid-century. These rising temperatures are poised to intensify heat-related stresses across various sectors.

Changing precipitation patterns further complicate Saudi Arabia's climate outlook. Historically, the country experiences minimal rainfall, with some areas receiving as little as 51 mm annually. Over the past 60 years, precipitation anomalies have fluctuated between -55% and $+74\%$. Future projections indicate significant increases in annual precipitation, up to 137.6% by 2050 under high emissions scenarios. However, this increase does not mitigate the rising frequency and intensity of droughts, which are expected to become 41% more frequent for agricultural droughts and 33% for hydrological droughts. This variability underscores the need for robust water management strategies.

The coastal regions of Saudi Arabia are particularly vulnerable to sea-level rise and extreme sea level events. The Red Sea and Persian Gulf are experiencing relative sea level rises of approximately 3.88 mm and 3.6 mm per year, respectively. By 2050, global sea levels could rise between 0.18 and 0.23 meters, depending on emissions scenarios. Such increases will exacerbate coastal hazards, including erosion, storm tide inundation, and permanent flooding, affecting urban areas like Jeddah and the Dammam metropolitan area. A one-meter sea level rise could impact around 650 square kilometers of land, increasing the population exposed to annual coastal flooding from 140,000 to 200,000 by mid-century.

Water scarcity remains a critical issue, exacerbated by climate change. Saudi Arabia's renewable internal freshwater resources are limited to approximately 2.4 billion cubic meters per year, placing the country under extreme water stress. Projections suggest a potential reduction in groundwater recharge by up to 29.3% by 2050 under high emissions scenarios. With agriculture consuming over 80% of total water withdrawals and the population growing from 5 million in the early 1970s to nearly 35 million today, the pressure on water resources is immense and unsustainable without significant reforms.

The agricultural sector faces profound challenges from climate change. Rising temperatures and reduced precipitation are projected to decrease yields of key crops such as wheat, barley, and sorghum by up to 25% by century's end. While 95% of land suitable for date palm cultivation is expected to remain viable by 2050, this suitability will drastically decline by 2100. This shift could turn Saudi Arabia into a net importer of dates. The sector's heavy reliance on groundwater for irrigation, compounded by increasing water scarcity, necessitates more efficient water use and alternative irrigation methods.



Health impacts due to climate change are becoming increasingly evident. Rising temperatures have significantly increased heat-related mortality, with an 89% rise in heat-related deaths from 2000-2004 to 2018. Additionally, the prevalence of vector-borne diseases such as malaria, dengue, and Zika is expected to rise, with almost the entire population at risk by 2050. Air pollution remains a severe concern; in 2017, PM2.5 concentrations were the second highest globally, contributing to an estimated 8,536 annual deaths and 315,200 disability-adjusted life years.

The energy sector faces significant stress due to climate change. Rising temperatures have driven up the demand for cooling, with summer temperatures in Riyadh increasing by 2.65 to 3.07°C between 1980 and 2020. This has necessitated the addition of 1.2 gigawatts of electricity for every 1°C temperature increase. Although Saudi Arabia aims to generate 50% of its energy from renewables by 2030, the current energy mix is heavily dominated by fossil fuels. The energy infrastructure's vulnerability to extreme weather events underscores the urgent need for diversification and resilience in energy planning. The construction and tourism sectors also face significant challenges, requiring adaptive measures to sustain growth and ensure resilience against the impacts of climate change.

CHAPTER 2

KEY PROGRAMS RELATED TO VISION 2030

National Transformation Program (NTP)

The National Transformation Program (NTP), launched in 2016, is a pivotal part of Saudi Arabia's Vision 2030, aiming to reduce the nation's dependency on oil revenues and diversify its economy. The NTP outlines a comprehensive plan with strategic objectives, performance targets, and initiatives across various sectors, including energy, health, education, and transportation. Key goals include boosting non-oil commodity exports, increasing private sector participation, and improving infrastructure and public services. The program emphasizes public sector reforms, economic diversification, and social development, with a projected investment of SR270 billion (US\$70 billion), partly funded by the private sector. Despite challenges such as implementation risks and socio-political adjustments, the NTP seeks to create a resilient, diversified economy and foster a conducive environment for investment and innovation.

Public Investment Fund (PIF) Program

The Public Investment Fund (PIF) Program is a key element in Saudi Arabia's Vision 2030, aiming to transform the Kingdom's economy by 2025. As of 2020, PIF had assets valued at approximately SAR 1,500 billion. The program plans to inject \$40 billion annually into the Saudi economy until the end of 2025, equating to about 5% of the nation's GDP. Over this period, PIF's investments and portfolio companies are expected to contribute \$320 billion to GDP and create 1.8 million job years. The PIF targets significant growth in various sectors, including renewable energy, where it aims to develop 70% of Saudi Arabia's 58.5GW renewable energy capacity by 2030. The program also emphasizes diversifying investments away from hydrocarbons, with expected average annual returns from different investment pools ranging from 6.5% to 9.0%. The PIF's ambitious goal is to grow its assets under management to USD 2 trillion, reinforcing its pivotal role in the Kingdom's economic diversification and sustainability effort.

National Industrial Development and Logistics Program (NIDLP)

The National Industrial Development and Logistics Program (NIDLP) aims to transform Saudi Arabia into a leading industrial powerhouse and global logistics hub by leveraging its energy, mining, industry, and logistics sectors. As part of Vision 2030, NIDLP has ambitious goals for sustainable growth and economic diversification. By 2020, the program had attracted over SAR 300 billion in investments, creating more than 50,000 jobs. Notable achievements include increasing the Kingdom's gas processing capacity to 18.3 billion standard cubic feet per day and significant strides in renewable energy, with projects like the Sakaka and Dumat Al-Jandal contributing over 3,600 MW of green energy and reducing greenhouse gas emissions by more than 7 million tons. NIDLP also emphasizes the integration of advanced technologies from the Fourth Industrial Revolution to enhance productivity and sustainability. Efforts include establishing smart grids, automating energy distribution, and fostering local manufacturing capabilities for renewable energy components. The program's focus on sustainability is evident in initiatives aimed at improving energy efficiency, reducing reliance on liquid fuels, and increasing the local

content in various industries. Through these measures, NIDL seeks to achieve a more diversified and resilient economy, aligned with the Kingdom's long-term sustainability and economic goals.

Financial Sector Development Program (FSDP)

The Financial Sector Development Program (FSDP) aims to create a thriving, diversified financial sector in Saudi Arabia to support the broader goals of Vision 2030. By 2030, the program targets a significant growth in the banking sector, increasing total banking assets to SAR 4.553 billion from SAR 2.631 billion in 2019. It also plans to enhance the stock market's value, raising it to 88% of GDP from 66.5%, and to increase SME financing from 5.7% to 20% of bank loans. On the sustainability front, the program focuses on digital infrastructure, aiming for 80% cashless transactions by 2030, up from 36% in 2019, which will improve operational efficiency and customer experience. Additionally, it aspires to expand the insurance sector, increasing gross written premiums to 4.3% of non-oil GDP from 1.9% in 2019, and ensuring financial stability by adhering to international standards. These measures collectively aim to bolster financial inclusion, stimulate economic growth, and ensure the sector's long-term sustainability.

National Renewable Energy Program (NREP)

The National Renewable Energy Program (NREP), supported by the Public Investment Fund (PIF), aims to establish a robust renewable energy infrastructure in Saudi Arabia, targeting a capacity of 11.8 GW with Acwa Power by 2025. This ambitious program is a critical component of Saudi Arabia's Vision 2030, which aims to generate 50% of the country's electricity from renewable sources, with the remaining 50% from natural gas. The NREP leverages the country's significant solar and wind potential, particularly in regions like Tabuk and Asir for solar energy, and the northeast and central regions for wind energy. Additionally, the program includes comprehensive support mechanisms such as the Renewable Energy Projects Development Office (REPDO), which provides resources and data to facilitate local and international investments. The REPDO's initiatives include the "We Supply Renewables" portal, offering a detailed supplier database to meet local content requirements, and the Renewable Resource Atlas, providing extensive renewable energy data. These efforts collectively enhance the investment ecosystem, ensuring clear governance, regulatory frameworks, and various incentives to attract private sector participation, thereby bolstering investor confidence and driving the nation's decarbonization journey.



CHAPTER 3

MECHANISMS OF CAPITAL MARKETS IN SUPPORTING NET-ZERO TARGETS

The transition to a net zero economy requires a concerted effort from all components of the capital markets, including stock exchanges, investment banks, asset managers, regulatory bodies, investors, and corporate issuers. Each plays a vital role in fostering sustainable finance, enhancing transparency, and driving investments toward environmentally and socially responsible projects. By integrating ESG criteria, facilitating the issuance and trading of green financial instruments, and enforcing rigorous disclosure standards, these entities collectively propel the global agenda for decarbonization and sustainable development.

Component	Role and Key Activities in Net Zero Transition
Stock Exchanges	Stock exchanges are crucial in promoting sustainable finance by facilitating the listing and trading of green and sustainability-linked financial instruments. They implement and enforce ESG and climate risk disclosure standards, aligning with frameworks such as the Task Force on Climate-related Financial Disclosures (TCFD). Exchanges develop and maintain green bond and sustainability indices, providing benchmarks that attract investments towards environmentally responsible companies. By launching platforms for trading carbon credits and renewable energy certificates, stock exchanges enhance market liquidity and transparency, fostering a robust environment for sustainable investment. Additionally, they offer sustainability-focused training and resources for listed companies to encourage better ESG practices and compliance
Investment Banks	Investment banks play a pivotal role in structuring and underwriting green and sustainability-linked bonds and loans, channeling essential capital towards sustainable projects. They provide comprehensive advisory services on ESG integration, climate risk management, and corporate strategies for decarbonization and carbon pricing. By conducting rigorous ESG due diligence and climate risk assessments for mergers and acquisitions, investment banks ensure that investments align with sustainability goals. They design innovative financial instruments such as green bonds and sustainability-linked loans to support the financing needs of renewable energy projects, energy efficiency initiatives, and other green technologies. Their expertise in capital raising for green projects and technologies significantly contributes to the growth and development of the sustainable finance market and by activating the role of Sharia authorities in reviewing the standards of Sharia-compliant investments, Sharia-compliant investors can be directed to green and sustainable investments.

Asset Managers

Asset managers integrate ESG and climate risk factors into their investment analysis and decision-making processes, steering capital towards sustainable and impact investments. They develop and manage thematic funds focused on specific sustainability goals, such as renewable energy, clean technology, and the circular economy. Utilizing comprehensive ESG integration frameworks and data from providers like MSCI and Sustainalytics, asset managers make informed investment decisions that consider long-term environmental and social impacts. Through stewardship and active ownership initiatives, they engage with investee companies to improve their ESG performance and climate risk management practices. Participation in collaborative efforts such as the Principles for Responsible Investment (PRI) and Climate Action 100+ allows asset managers to influence corporate behavior and promote industry-wide sustainability standards.

Regulatory Bodies

Regulatory bodies are essential in setting and enforcing standards for ESG and climate-related disclosures, ensuring transparency and accountability in financial markets. They develop and implement policies and incentives to promote sustainable finance, including tax incentives, subsidies, and regulatory frameworks that support green investments and technologies. By mandating the disclosure of climate-related financial risks and aligning national regulations with global standards such as the EU Taxonomy and TCFD, regulatory bodies provide a structured environment for sustainable finance to thrive. Additionally, they oversee the development and regulation of carbon markets, establishing and managing carbon pricing mechanisms like cap-and-trade systems and carbon taxes to drive reductions in greenhouse gas emissions. Their regulatory oversight ensures that these markets operate efficiently and effectively, contributing to global net zero targets.

Asset Managers

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Investors

Investors are increasingly channeling capital into sustainable and impact investments, driving demand for robust ESG and climate risk disclosures from investee companies. They conduct portfolio carbon footprinting to align with net-zero pathways, support companies with strong sustainability credentials, and promote sustainable practices through shareholder activism. Collaborative initiatives like Climate Action 100+ enable investors to push for greater transparency and accountability in ESG performance, helping accelerate the transition to a net-zero economy. Additionally, raising awareness among investors about Sharia principles, such as avoiding harm and extravagance, encourages wise resource use and investment focused on nurturing the Earth.

Corporate Issuers

Corporate issuers are responsible for issuing green, social, and sustainability-linked bonds and other financial instruments to fund projects that reduce carbon emissions and enhance sustainability. They develop and implement comprehensive net zero strategies, setting science-based targets for emissions reductions and integrating sustainability into their governance and risk management frameworks. Regular disclosure of progress towards net zero goals, aligned with global standards such as the Global Reporting Initiative (GRI) and the Sustainability Accounting Standards Board (SASB), ensures transparency and accountability to stakeholders. By engaging with investors, customers, employees, and other stakeholders on sustainability initiatives, corporate issuers foster a culture of environmental and social responsibility, contributing to the broader goals of sustainable development and climate action.

Saudi Arabia's capital markets are playing a crucial role in the country's transition towards achieving net-zero emissions by 2060. The capital markets provide essential funding, facilitate investment in sustainable projects, and promote financial mechanisms that align with environmental goals.

Green Bonds and Sukuk

Saudi Arabia is leveraging green bonds to finance large-scale renewable energy projects. In October 2022, the Public Investment Fund (PIF) completed its first green bond issuance, raising \$3 billion (SAR 11.25 billion) to fund green projects. The bond, issued in three tranches, was more than eight times oversubscribed with orders exceeding \$24 billion (SAR 90 billion). The tranches included \$1.25 billion (SAR 4.69 billion) for 5 years at a 5% coupon, \$1.25 billion (SAR 4.69 billion) for 10 years at a 5.25% coupon, and \$500 million (SAR 1.88 billion) for 100 years at a 5.375% coupon. This issuance, compliant with the Green Bond and Loan Principles 2021, highlights strong investor confidence in PIF's role in the Saudi economy and its commitment to sustainable investment as part of Saudi Vision 2030.

Saudi Arabia's is also set to sell green bonds, driven by a newly established green financing framework which signifies a strategic pivot towards sustainable economic practices and away from fossil fuel dependency. This framework, detailing eight categories of eligible projects such as renewable energy and cleaner transportation, sets the stage for significant environmental advancements. The government's goal of reducing greenhouse gas emissions by 278 million tons annually by 2030 and achieving net zero emissions by 2060 underscores the urgency and ambition of this initiative. Distinct from the Public Investment Fund's (PIF) existing green financing efforts, the Ministry of Finance will oversee these issuances through dedicated committees, ensuring rigorous oversight and alignment with international standards like the ICMA Green Bond Principles 2021. The PIF's prior success in developing Saudi Arabia's renewable energy infrastructure and its alignment with global climate goals highlights the potential impact of this green bond strategy. By integrating these frameworks, Saudi Arabia aims to attract sustainable investments, bolster its transition to a low-carbon economy, and solidify its commitment to combating climate change on a global scale.

Voluntary Carbon Markets

The Regional Voluntary Carbon Market Company (RVCMC), established by Saudi Arabia's Public Investment Fund (PIF) in partnership with the Saudi Tadawul Group, represents a pivotal move towards achieving the kingdom's net zero emissions target by 2060. With PIF holding an 80% stake and Tadawul 20%, RVCMC is designed to facilitate carbon credit trading and support regional businesses in reducing emissions. This initiative aligns with Saudi Arabia's broader strategy to diversify its economy away from oil and commit to significant carbon reduction efforts. The RVCMC's auctions have already set records, with 2.2 million tons sold in 2023, demonstrating the region's growing demand for carbon credits. By collaborating with Xpansiv to launch a carbon credit exchange, RVCMC aims to provide robust, transparent market infrastructure, essential for scaling global carbon finance.

This move is part of Saudi Vision 2030 and the Saudi Green Initiative, reinforcing the kingdom's leadership in climate action and investment in sustainable projects. The company's efforts are crucial in channeling climate finance to the Global South, thereby playing a significant role in the global transition to a low carbon economy.

Integration of ESG Criteria

The Saudi Stock Exchange (Tadawul), being a central player in the Kingdom's financial landscape, is uniquely positioned to influence and accelerate this journey. In 2018, Tadawul, Saudi Arabia's stock exchange, strategically joined the United Nations' Sustainable Stock Exchanges (SSE) initiative, aligning with global best practices in ESG standards. This partnership integrates sustainability into Tadawul's operations, connecting it with over 80 global exchanges committed to fostering sustainable investment and corporate transparency. CEO Khalid Al Hussan views this as a catalyst for sustainable development in Saudi Arabia's capital markets, facilitating collaboration with international peers. Tadawul's engagement with the SSE positions it to capitalize on the expanding green bond market and the increasing focus on ESG disclosure, thereby reinforcing its market credibility and contributing to global sustainable finance efforts.

The concept of ESG is going to be more rounded and accepted by emphasizing its congruence with Sharia principles in Finance and investment, protecting all from any harm and encouraging all to engage in sustainable development.

The Saudi Exchange's ESG Disclosure Guidelines provide a framework for embedding ESG principles into corporate operations, aligning with Vision 2030's goals for economic transformation and global connectivity. By promoting ESG awareness and reporting among listed companies, the Exchange enhances transparency and accountability, attracting long-term institutional investors and fostering resilience. The guidelines advocate integrating ESG into corporate governance, involving senior management to ensure ESG considerations are central to strategy and risk management. By aligning with global standards, these guidelines position the Saudi Exchange as a catalyst for sustainable growth, supporting the UN Sustainable Development Goals and contributing to the Kingdom's socio-economic development.

Circular Carbon Economy (CCE)

The Circular Carbon Economy (CCE) is a comprehensive framework designed to manage and reduce carbon emissions through a closed-loop system of four Rs: reduce, reuse, recycle, and remove. This approach aims to balance economic growth with environmental sustainability by promoting efficient use of resources and innovative carbon management techniques.

For instance, Saudi Arabia is actively implementing CCE strategies to support its net-zero goals. The country is investing heavily in carbon capture, utilization, and storage (CCUS) technologies, which are pivotal for reducing industrial CO2 emissions. Additionally, the establishment of the Circular Carbon Economy Index by KAPSARC (King Abdullah Petroleum Studies and Research Center) provides a comparative overview of countries' readiness and progress in adopting circular carbon strategies, highlighting best practices and areas for improvement globally.

Moreover, international cooperation is enhancing the CCE framework's effectiveness. The European Union and China have agreed on a joint roadmap to advance circular economy practices, focusing on key areas like plastics, battery value chains, and remanufacturing. This collaboration underscores the global nature of the circular economy and its importance in achieving climate goals.

Incorporating CCE principles can significantly contribute to a sustainable future by minimizing waste, reducing dependency on finite resources, and cutting down greenhouse gas emissions. This holistic approach is crucial for addressing the triple planetary crisis of climate change, biodiversity loss, and environmental pollution, promoting a more resilient and sustainable global economy.

CHAPTER 4

ANALYSIS OF SAUDI ARABIA'S NET ZERO TARGETS AND DECARBONIZATION STRATEGY

Saudi Arabia's commitment to achieving net zero by 2060 presents numerous challenges and uncertainties. This ambitious goal, announced in 2021, lacks a detailed roadmap and remains unlegislated. In this comprehensive analysis, we delve into the statistical data and numerical insights to evaluate Saudi Arabia's current position and the feasibility of reaching net zero by 2060.

Firstly, Saudi Arabia's greenhouse gas emissions are projected to rise significantly by 2030, reaching between 520 and 800 million tonnes of CO₂ equivalent (MtCO₂e) depending on land use and forestry sector contributions. This range indicates a potential increase from the current levels of approximately 700 MtCO₂e in 2021, highlighting a troubling trend that contradicts the goals set by the Paris Agreement. The Climate Action Tracker (CAT) rates Saudi Arabia's climate policies as "Critically Insufficient," suggesting that without substantial policy changes, the nation is far from aligning with the 1.5°C global temperature limit.

The Kingdom's reliance on carbon capture and storage (CCS) technologies as a primary decarbonization strategy is concerning. CCS is still an unproven technology at the required scale and diverts attention from more immediate, viable solutions like renewable energy deployment. The current operational CCS plant in Saudi Arabia is primarily used for enhanced oil recovery (EOR), rather than reducing net emissions. The government's target to capture and store 44 million tonnes of CO₂ annually by 2035 is ambitious but lacks the necessary infrastructure and proven effectiveness to be a reliable cornerstone of its net-zero strategy.

Saudi Arabia's renewable energy sector has seen limited progress. Despite the target to generate 50% of electricity from renewable sources by 2030, less than 1% of electricity was generated from renewables in 2022, with only 0.4 GW of installed renewable capacity. The disparity between announced targets and actual implementation indicates significant obstacles in policy execution and investment in renewable energy infrastructure.

The country's energy mix remains heavily dominated by fossil fuels, with oil and gas accounting for nearly 100% of total energy supply in 2020. This heavy reliance not only exacerbates emissions but also underscores the challenges Saudi Arabia faces in transitioning to a sustainable energy system. The government's continued investment in expanding oil production capacity to 13 million barrels per day by 2027 further contradicts its climate commitments.

Economically, Saudi Arabia remains highly dependent on hydrocarbon revenues, which accounted for around 68% of its total budget revenues in 2022. The nation's strategic plans seem to be more focused on sustaining oil revenues than on genuine economic diversification. This dependency poses a significant risk as the world transitions to low-carbon energy sources, potentially leaving Saudi Arabia economically vulnerable in a decarbonized global market.

On the international stage, Saudi Arabia has been a notable obstructor in climate negotiations, often opposing language aimed at phasing out fossil fuels and limiting global warming to 1.5°C. This resistance raises doubts about its willingness to engage in meaningful global climate action. At COP27, Saudi Arabia strongly opposed language around fossil fuel phase-down, reflecting its entrenched position in the fossil fuel economy.

The Kingdom's "Vision 2030" aims to diversify its economy but lacks clear, actionable steps to phase out fossil fuels. Instead, it promotes a Circular Carbon Economy (CCE) approach, relying heavily on CCS and blue hydrogen—both of which are contentious and unproven at scale. This approach does not adequately address the need for a substantial reduction in fossil fuel use, which is essential for achieving net-zero emissions.

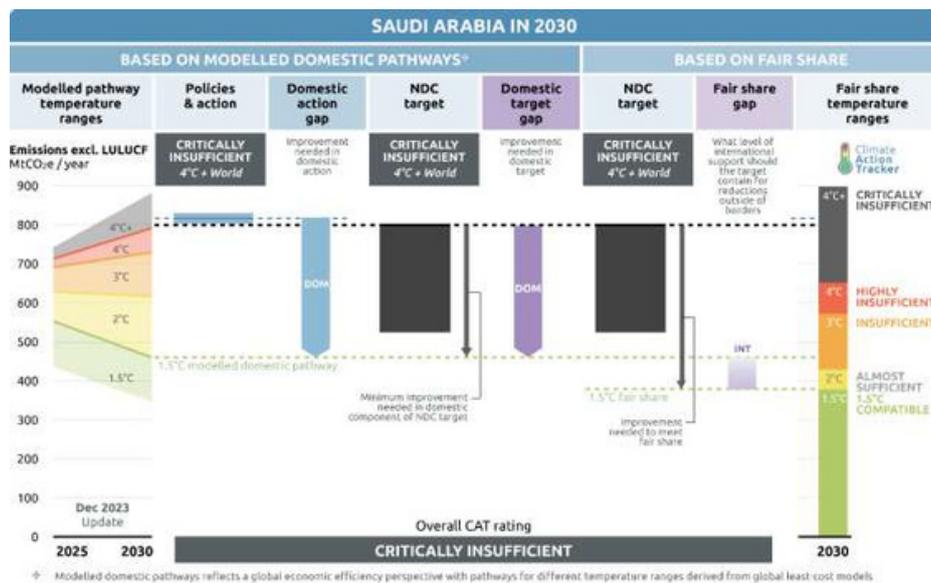
Saudi Arabia's updated Nationally Determined Contribution (NDC), submitted in 2021, aims to reduce emissions by 278 MtCO_{2e} annually by 2030. However, this target is based on a baseline scenario that has not been explicitly communicated, leading to uncertainties in its effectiveness. The NDC also includes a "get out clause" allowing for adjustments if international climate policies negatively impact hydrocarbon exports, further undermining its credibility.

The country's track record of setting ambitious renewable energy targets without substantial follow-through is problematic. The initial target set in 2013 to install 54 GW of renewable energy by 2032 has seen multiple revisions and little actual progress. The latest target aims for 57.8 GW by 2030, but the current pace of renewable energy development suggests that this goal is unlikely to be met without significant policy and investment shifts.

Transportation and building sectors also face substantial decarbonization challenges. While Saudi Arabia has introduced measures to improve energy efficiency in buildings and expand its public transportation network, progress has been slow. The King Abdulaziz Public Transport project in Riyadh, aimed at modernizing transportation, has faced delays, and the rail transport expansion lacks clarity on whether it will be electric or diesel-powered.

Saudi Arabia's recent initiatives in the electric vehicle (EV) sector, including the introduction of its first domestic EV brand Ceer and the goal for 30% of Riyadh's vehicles to be electric by 2030, are positive steps. However, the current infrastructure and market penetration of EVs are minimal, requiring accelerated deployment of charging stations and incentives to promote greater adoption.

The government's plans to plant 450 million trees by 2030 as part of the Saudi Green Initiative are ambitious but unrealistic given the current progress. As of 2021, only 10 million trees had been planted, and the existing land use and forestry sink is minimal, covering just 0.5% of Saudi Arabia's total land area.



CHAPTER 5

RECOMMENDATIONS FOR SAUDI CAPITAL MARKET PARTICIPANTS TO SUPPORT SAUDI ARABIA IN ITS NET ZERO TRANSITION

Category	Components	Details
Regulatory Framework	Phased ESG Reporting Requirements	<p>Implementation Timeline: Implement a phased approach starting with large-cap companies in Year 1-2, expanding to mid-cap in Year 3-4, and small-cap companies in Year 5-6. The Capital Market Authority (CMA) should monitor compliance, mandating detailed annual ESG reports that include metrics on carbon footprint, water usage, energy consumption, waste management, and social impact.</p> <p>Lead: Regulatory Bodies (CMA).</p> <p>Cooperation Mechanism: Collaborate with investment banks and asset managers to ensure companies meet investor expectations for ESG disclosures.</p> <p>Data and Technology: Utilize blockchain for immutable record-keeping, AI for analyzing ESG data, and big data analytics for real-time monitoring and reporting. Integrate IoT devices for continuous environmental monitoring.</p>
Regulatory Framework	Islamic ESG Index	<p>Creation of Islamic ESG Index: Develop an index that tracks companies complying with both Shariah principles and high ESG standards. Criteria for inclusion will involve rigorous ESG metrics combined with compliance to Islamic finance principles.</p> <p>Lead: Tadawul.</p> <p>Cooperation Mechanism: Partner with Islamic finance regulatory bodies and Shariah boards to develop criteria. Collaborate with asset managers and investment banks to promote the index and educate investors.</p> <p>Data and Technology: Utilize AI to continuously evaluate compliance with Islamic and ESG criteria. Implement blockchain for transparent and secure index management.</p>

Market Mechanisms	Advanced Carbon Trading Platform	<p>Cap-and-Trade System: Implement a national cap-and-trade system targeting high-emission sectors such as energy, cement, and petrochemicals. Establish a robust national carbon registry using blockchain to track emissions and transactions, ensuring transparency and compliance. The system will involve a gradually declining cap on total emissions and allow companies to trade emission allowances.</p> <p>Lead: Regulatory Bodies (CMA).</p> <p>Cooperation Mechanism: Coordinate with corporate issuers for cap setting and compliance. Engage with corporate issuers to participate in trading and meet emission targets.</p> <p>Data and Technology: Use AI for predictive analytics and market optimization. Integrate IoT for real-time emission tracking.</p>
Market Mechanisms	Carbon Credit Exchange	<p>Carbon Credit Exchange: Develop a transparent carbon credit exchange platform to facilitate the trading of verified carbon credits. Credits must adhere to standards set by organizations such as Verra and Gold Standard. Eligible projects include renewable energy installations, reforestation, and carbon capture and storage (CCS).</p> <p>Lead: Tadawul.</p> <p>Cooperation Mechanism: Work with investment banks to structure carbon credit products. Partner with corporate issuers to develop and verify projects.</p> <p>Data and Technology: Utilize blockchain for tracking and verification. Employ data analytics to assess the impact and efficiency of credit projects.</p>
Market Mechanisms	Carbon Credit Exchange	<p>Incentivize Green Listings: Offer incentives such as reduced listing fees, expedited IPO processing, and enhanced visibility for companies meeting stringent ESG criteria. Companies must demonstrate clear sustainability strategies, continuous improvement plans, and transparency in reporting to qualify.</p> <p>Lead: Tadawul.</p> <p>Cooperation Mechanism: Engage with regulatory bodies to establish criteria. Engage investment banks to facilitate the listing process.</p> <p>Data and Technology: Use a centralized platform for investor access and market analysis, supported by advanced data analytics tools.</p>

Incentive Structures	Tax and Financial Incentives	<p>Tax Benefits: Collaborate with the Ministry of Finance to implement targeted tax incentives such as accelerated depreciation for renewable energy investments, R&D tax credits for clean technology development, and tax deductions for energy efficiency projects.</p> <p>Lead: Regulatory Bodies (Ministry of Finance).</p> <p>Cooperation Mechanism: Engage with investment banks and corporate issuers to ensure companies utilize these incentives.</p> <p>Data and Technology: Use advanced data systems to track compliance and impact of these incentives.</p>
Capacity Building & Education	Comprehensive Education Programs	<p>Executive Training: Partner with leading business schools and international organizations to offer executive education programs on ESG integration, sustainable finance, and risk management. Programs will include case studies, workshops, and certifications.</p> <p>Lead: Academic Institutions.</p> <p>Cooperation Mechanism: Collaborate with regulatory bodies to develop curricula. Engage with investment banks and asset managers to provide practical insights and case studies.</p> <p>Data and Technology: Utilize AI-driven personalized learning platforms to enhance training effectiveness.</p>
Capacity Building & Education	Comprehensive Education Programs	<p>Investor Education: Develop online platforms and in-person seminars to educate investors on the benefits and methodologies of sustainable investing, ESG risk assessment, and how to utilize ESG indices and reports for investment decisions.</p> <p>Lead: Tadawul.</p> <p>Cooperation Mechanism: Work with asset managers to provide educational content and investment tools. Partner with corporate issuers to highlight success stories and case studies.</p> <p>Data and Technology: Use blockchain for secure, transparent educational content distribution. Employ data analytics to track investor engagement and learning outcomes.</p>
Capacity Building & Education	Innovation and Research Hubs	<p>Establishment of Centers: Create innovation hubs in partnership with universities like KAUST and international research institutions, focusing on R&D in sustainable technologies. Hubs will provide funding, mentorship, and infrastructure support for startups and research projects.</p> <p>Lead: Academic Institutions.</p> <p>Cooperation Mechanism: Collaborate with regulatory bodies for research initiatives. Engage corporate issuers and investment banks to support commercialization of innovations.</p> <p>Data and Technology: Use cloud computing and big data for collaborative research and development.</p>
Capacity Building & Education	Spreading Awareness and Knowledge	<p>Spreading awareness about the significant positive impact of applying Sharia Standards on increased sustainable investments which is also ESG compliant.</p>

Stakeholder Engagement	Corporate and Public Engagement Initiatives	<p>Stakeholder Dialogues: Organize regular forums and roundtables involving companies, investors, regulators, and civil society to discuss sustainability challenges and share best practices. Feedback from these engagements will inform policy updates and framework improvements.</p> <p>Lead: Regulatory Bodies (CMA).</p> <p>Cooperation Mechanism: Facilitate dialogue with all stakeholders to ensure comprehensive input.</p> <p>Data and Technology: Use online platforms and digital tools for wider engagement and data collection. Implement AI for sentiment analysis and trend identification.</p>
Stakeholder Engagement	Corporate and Public Engagement Initiatives	<p>Collaborative Platforms: Establish industry consortia to develop sector-specific sustainability standards and collaborative projects.</p> <p>Lead: Corporate Issuers.</p> <p>Cooperation Mechanism: Work with regulatory bodies to develop standards. Partner with asset managers and investment banks to finance joint projects.</p> <p>Data and Technology: Use blockchain for secure, transparent collaboration and data sharing. Employ big data analytics to monitor progress and impact.</p>
Monitoring and Reporting	Performance Metrics and Reporting	<p>Development of KPIs: Establish detailed KPIs to measure sustainability performance across various dimensions, including GHG emissions, energy consumption, water usage, and social impact. Companies must report these KPIs annually, with data verified by third-party auditors.</p> <p>Lead: Tadawul.</p> <p>Cooperation Mechanism: Engage with corporate issuers for accurate data collection. Partner with investment banks and asset managers to ensure comprehensive KPI reporting.</p> <p>Data and Technology: Use data analytics and AI to analyze performance trends and provide actionable insights. Implement blockchain for secure and transparent reporting.</p>
Monitoring and Reporting	Performance Metrics and Reporting	<p>Periodic Reporting and Public Access: Implement a structured reporting framework requiring companies to publish annual sustainability reports. CMA to compile and publish an annual state-of-the-market sustainability report, summarizing progress, challenges, and future plans. Reports are made publicly accessible online, ensuring transparency and accountability.</p> <p>Lead: Regulatory Bodies (CMA).</p> <p>Cooperation Mechanism: Collaborate with corporate issuers for comprehensive data collection. Engage with asset managers to ensure investor transparency.</p> <p>Data and Technology: Use blockchain for secure, transparent reporting and real-time</p>

Implementation of this framework would require significant expertise in advisory, consultancy and training of all stakeholders involved. The following table outlines the services need to implement each component of the aforementioned framework.

Category	Components	Advisory & Consultancy	Training
Regulatory Framework	Phased ESG Reporting Requirements	<ul style="list-style-type: none"> Advanced ESG risk assessments using scenario analysis and stress testing. Development and implementation of tailored ESG reporting frameworks compliant with global standards (GRI, SASB, TCFD) and local guidelines. Integration of ESG metrics into enterprise risk management systems and supply chain operations. Development of digital platforms for ESG data collection, analysis, and reporting and implementation of blockchain solutions for transparency. 	<p>Provision of specialized training programs on ESG reporting standards, regulatory compliance, and the use of AI and big data analytics for real-time monitoring and reporting.</p> <p>Workshops on integrating IoT devices for continuous environmental monitoring</p>
Regulatory Framework	Islamic ESG Index	<ul style="list-style-type: none"> Establishment of ESG and Shariah compliance criteria for the index, including detailed screening methodologies and performance benchmarks. Development of continuous compliance monitoring tools using AI and machine learning. Enhancement of corporate governance frameworks in line with Islamic finance principles. 	<p>Education of companies and investors on the benefits and requirements of the Islamic ESG Index.</p> <p>Provision of technical training on the use of AI and blockchain for real-time evaluation and index management.</p>
Market Mechanisms	Advanced Carbon Trading Platform	<ul style="list-style-type: none"> Designing the architecture and operational guidelines for a national cap-and-trade system, including detailed protocols for emission caps and trading mechanisms. Establishment of a robust carbon registry using blockchain technology for transparency and compliance. Supporting corporate issuers in achieving compliance with cap-and-trade regulations through detailed emissions audits and verification processes. Development of digital platforms for tracking emissions and trading allowances. 	<p>Provision of comprehensive training on cap-and-trade mechanisms, carbon trading strategies, and the integration of AI for market optimization.</p> <p>Technical workshops on using IoT devices for real-time emission tracking and monitoring.</p>

Market Mechanisms	Carbon Credit Exchange	<ul style="list-style-type: none"> • Development of detailed standards and frameworks for the verification and certification of carbon credits, ensuring alignment with international standards (Verra, Gold Standard). • Structuring carbon credit projects to maximize environmental benefits and financial returns. • Implementation of blockchain solutions for tracking and verification. 	<p>Advanced training programs on the principles and mechanics of carbon credit trading, including the use of data analytics to assess the impact and efficiency of credit projects. Provision of technical education on blockchain integration for verification processes.</p>
Market Mechanisms	Incentivize Green Listings	<ul style="list-style-type: none"> • Development of strategic criteria and incentive structures for green listings, including reduced listing fees, expedited IPO processing, and enhanced visibility for companies meeting stringent ESG criteria. • Integration of sustainability strategies into business models for qualification. • Assisting companies in preparing for green listings by aligning their operations with ESG criteria, conducting comprehensive sustainability assessments and reporting practices. 	<p>Education on the green listing process, the benefits of green listings, and the implementation of sustainability strategies in corporate operations.</p> <p>Technical training on utilizing digital tools for continuous monitoring and reporting.</p>
Incentive Structures	Tax and Financial Incentives	<ul style="list-style-type: none"> • Recommendations on policy changes and strategic frameworks for tax incentives that promote sustainable investments and operations. • Design and implementation of financial incentives to maximize environmental and economic benefits. • Assisting companies in claiming tax incentives by ensuring compliance with relevant regulations, preparing necessary documentation, and conducting financial impact assessments. • Development of digital systems for tracking and reporting on tax incentive utilization and outcomes. 	<p>Educating companies on available tax incentives, qualification criteria, and the benefits of incorporating sustainable practices into their operations.</p> <p>Provision of technical training on the application and management of tax incentives for sustainability projects.</p>

Capacity Building & Education	Comprehensive Education Programs	<ul style="list-style-type: none"> • Development of comprehensive ESG-related educational content tailored to various sectors, including detailed case studies and best practices. • Incorporation of cutting-edge research and industry trends into educational curricula. • Design and delivery of advanced training programs for executives on ESG integration, sustainable finance, and risk management, utilizing AI-driven personalized learning platforms for enhanced effectiveness. 	<p>Provision of ongoing education and certification programs on ESG principles, sustainable finance, and risk management.</p> <p>Interactive and immersive learning experiences through digital platforms and AI-enhanced training tools.</p>
Capacity Building & Education	Innovation and Research Hubs	<ul style="list-style-type: none"> • Identification of strategic opportunities for innovation in sustainable technologies and provision of detailed advice on the establishment and operation of innovation hubs. • Securing funding and partnerships for research and development initiatives. • Support startups with mentorship, funding strategies, and infrastructure for research and development in sustainable technologies. • Implementation of cloud computing solutions for collaborative research and big data analytics for innovation management. 	<p>Provision of advanced workshops and courses on R&D in sustainable technologies, commercialization strategies, and the use of big data and AI in research.</p> <p>Training on securing funding and building strategic partnerships for innovation projects.</p>
Stakeholder Engagement	Corporate and Public Engagement Initiatives	<ul style="list-style-type: none"> • Design and facilitation of stakeholder engagement processes, including regular forums and roundtables. • Provision of strategic advice on best practices for effective engagement and communication. • Provision of insights and recommendations based on stakeholder feedback, utilizing advanced analytics for sentiment analysis and trend identification. 	<p>Comprehensive training on effective stakeholder engagement strategies, the use of digital tools for engagement, and the implementation of AI for sentiment analysis and trend identification.</p>

Stakeholder Engagement	Collaborative Platforms	<ul style="list-style-type: none"> • Creation of strategic frameworks for industry collaboration to develop sector-specific sustainability standards and joint projects. • Advisory on effective collaboration models and governance structures. • Facilitation of joint projects and collaborations by providing support in project management, financing, and stakeholder engagement. • Utilization of blockchain for secure collaboration and big data analytics for monitoring progress and impact. 	Educating industry participants on best practices for collaborative sustainability initiatives, the use of blockchain for secure data sharing, and big data analytics for monitoring progress and impact.
Monitoring and Reporting	Performance Metrics and Reporting	<ul style="list-style-type: none"> • Development of detailed KPIs and reporting frameworks tailored to different sectors, incorporating advanced sustainability metrics and performance indicators. • Advisory on best practices for effective performance monitoring and reporting. 	Provision of training on performance monitoring and reporting best practices, the use of AI for data analysis and trend identification, and the importance of transparency and accountability in reporting.
Monitoring and Reporting	Audit and Compliance Mechanisms	<ul style="list-style-type: none"> • Develop audit standards and compliance mechanisms that align with international best practices. • Strategic advice on implementing effective audit processes. Conduct audits and provide compliance support to ensure adherence to sustainability regulations and standards. 	Training of companies on audit and compliance processes, the use of technology for compliance monitoring, and the importance of regular audits in maintaining high standards.

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