



Manufacturing Africa



CEMENT DECARBONIZATION WEBINAR REPORT

May, 2024



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Executive Summary

On the 28th of March, 2024, the Energy Transition Office (ETO), UK-FCDO's Manufacturing Africa, Nigeria's National Council on Climate Change, and Sustainable Energy for All (SEforAll) co-convened a webinar on Cement Decarbonization in Nigeria. The webinar aligns with the country's ambitious goal of achieving Net Zero emissions by 2060, outlined in the Federal Executive Council approved Energy Transition Plan (ETP).

The ETP targets tackling energy poverty and climate change. It aims to achieve UN Sustainable Development Goal 7 (SDG7) for affordable and clean energy by 2030 and carbon neutrality by 2060.

The webinar aimed to share insights from the UK-FCDO's sponsored market study of the Cement Industry in Nigeria done in partnership with the National Council on Climate Change, Energy Transition Office and Sustainable Energy For All. Recognizing the cement industry's significant contribution to emissions, the webinar served as a platform to share insights from the UK FCDO-sponsored study with stakeholders in Nigeria. This study provided a critical foundation for the discussions. Experts, stakeholders from major cement companies (Lafarge, Dangote, BUA), academia, civil society, and government representatives all participated, reflecting the broad approach of the Energy Transition Office which sees industry, power, transport, clean cooking, and oil & gas as crucial sectors for successful emission reduction implementation.

The session's key objectives were to disseminate findings from the UK FCDO-sponsored study to inform discussions on decarbonization strategies, extract insights and perspectives from across the industry and develop strategies aligned with Nigeria's Net Zero commitment.

Discussions highlighted the critical role of the cement sector due to its high carbon intensity. As Africa's leading producer and emitter of cement, Nigeria faces pressure to address potential future emission increases, particularly considering the country's booming economy and urbanization trends. The session emphasized the urgency of decarbonization efforts. Stakeholders stressed the need to encourage the adoption of more sustainable methods while maintaining profitability, explore options like switching fuels and utilizing waste to reduce emissions, promote cooperation throughout the cement value chain, including technological know-how and proper waste management practices, advocate for government incentives, targeted investments, and proactive actions to support decarbonization efforts.



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Webinar Resolutions, Recommendations, and Observations:

The webinar highlighted several critical points for achieving a cleaner cement industry in Nigeria:

- 1. Cement's Outsized Role:** Nigeria's high reliance on cement production, coupled with its energy-intensive nature, makes decarbonization essential. As Africa's second-largest producer and emitter, addressing emissions growth is crucial, especially considering its link to economic development.
- 2. Incentivizing Greener Practices:** Balancing profitability with sustainability requires incentives for greener production methods. The focus on alternative fuels and reducing energy consumption across industries aligns with Nigeria's need to tackle its 65% emissions share from energy and industry.
- 3. Collaboration is Key:** Effective decarbonization requires collaboration across the cement value chain. Sharing technical expertise and addressing waste management issues are crucial. Public awareness campaigns can promote better waste segregation practices at all levels.
- 4. Government Support for Change:** Shifting to lower-emission fuels and materials requires government incentives. Supporting the transition from fossil fuels to cleaner alternatives like solar power and calcined clay is essential.
- 5. Innovation and Consumer Awareness:** Promoting material substitution with lower-carbon alternatives requires stakeholder engagement, technology adoption, and consumer education. The ETP's decarbonization strategy, with its focus on feedstock substitution and bioenergy, offers a promising path forward.
- 6. Balancing Growth with Sustainability:** Meeting cement demand while reducing emissions requires targeted investments and proactive measures. Cost remains a challenge, highlighting the need for a supportive environment for decarbonization projects.
- 7. Collective Action for Success:** The growing interest in material substitution underscores the importance of government commitment and collaboration. A unified effort from all stakeholders is vital to achieve a sustainable and decarbonized cement industry in Nigeria.

ORGANIZERS: _____

Energy Transition Office (ETO), UK-FCDO's Manufacturing Africa, Nigeria's National Council on Climate Change, and Sustainable Energy for All (SEforAll)

GOAL: _____

Align with Nigeria's Net Zero target by 2060 (outlined in the Energy Transition Plan)

FOCUS: _____

Decarbonization of the Cement Industry (major source of emissions in Nigeria)

FOCUS: _____

Experts, major cement companies (Lafarge, Dangote, BUA), academia, civil society, government representatives

UK-FCDO SPONSORED STUDY: _____

Provided a foundation for discussions, shared insights with stakeholders

REMARKS: ★★★★★

OBJECTIVES: _____

- Disseminate UK-FCDO study findings
- Discuss decarbonization strategies
- Develop strategies for Net Zero commitment

KEY POINTS: _____

- Cement sector's high carbon intensity is crucial for discussions.
- Nigeria, Africa's leading producer and emitter, faces pressure to address potential future emission increases due to economic growth and urbanization.
- Decarbonization efforts are urgent.
- **Stakeholders emphasized:**
 - Adoption of sustainable methods while maintaining profitability
 - Exploring options like switching fuels and waste utilization
 - Cooperation throughout the cement value chain (technology & waste management)
 - Advocating for government incentives, investments, and actions to support decarbonization

Background

The cement sector, responsible for 16% of industrial emissions is crucial for infrastructure development and its reliance on traditional clinker production creates significant emissions challenges. This is especially concerning as demand is expected to grow alongside the country's population and economic boom.

To address this issue, a recent webinar convened stakeholders and experts to discuss the industry's role in emissions and explore strategies for decarbonization faces challenges due to the clinker production process. With Nigeria's ongoing population and economic growth, cement demand is expected to rise, potentially increasing emissions. The goal of the webinar was to discuss how the cement business contributes to emissions, get input from stakeholders and experts, and develop strategies that will help Nigeria meet its carbon neutrality goal. It is a reflection of a larger initiative to include key sector stakeholders in order to accomplish the objectives stated in the Energy Transition Plan. The cement industry's crucial role in emission talks was underscored during the Cement Decarbonisation Session, owing to its elevated carbon intensity. The overall focus of the event was on how urgent it is for the cement industry to switch to sustainable methods in order to reduce emissions and promote environmental stewardship. The session focused on public-private involvement, awareness, and incentives while addressing potential, problems, and suggestions for decarbonising cement production. With talks and panel discussions, it brought together professionals from many industries for in-depth debates, information exchange, and idea sharing. The occasion emphasised how urgently sustainable practices are needed given the effects of climate change on the energy sector.



Nigeria's cement industry is a significant source of emissions (16% of industrial emissions) due to its reliance on traditional clinker production.



Nigeria's population and economic boom are expected to drive up cement demand, potentially increasing emissions due to the current production methods.



The webinar included stakeholders and experts to discuss the industry's role in emissions and explore decarbonization strategies.

Presentations & Discussions

The session kicked off with Ibilola Essien highlighting the pressing need to address emissions within the cement industry. Martine Sobey echoed this concern, emphasizing Nigeria's commitment to decarbonization despite ongoing population and urban growth. She pointed to energy consumption and industrial processes – including cement production – as major contributors to emissions. This segment emphasized the importance of public-private partnerships and strategic investments in achieving decarbonization goals.



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Lolade Abiola, representing the Energy Transition Office (ETO), outlined Nigeria's Energy Transition Pathways (ETP) and its ambitious target of net-zero emissions by 2060. She stressed the need for emission reductions across key sectors, particularly industry, where cement production plays a significant role. She presented strategies for decarbonizing cement production, such as replacing traditional materials (feedstock substitution), utilizing bioenergy, and adopting low-carbon heating alternatives. She underlined the potential for significant emissions reductions through these measures and emphasized the ETO's role in supporting their implementation.

Michael Ivenso, from the National Council on

Climate Change (NCCC), underscored the critical balance of preserving healthy profit margins while decarbonizing the industry. He discussed government initiatives to support this effort, including revising policies and forging partnerships with organizations like Manufacturing Africa. Michael highlighted the importance of stakeholder engagement and education to overcome challenges related to material substitution and waste management.

Olamide Obaleke from McKinsey presented a detailed analysis of the challenges and opportunities for decarbonizing Nigeria's cement sector, with a particular focus on waste-to-energy initiatives. She emphasized the urgency of decarbonization due to the industry's significant CO₂ footprint and projected rise in cement production by 2035.

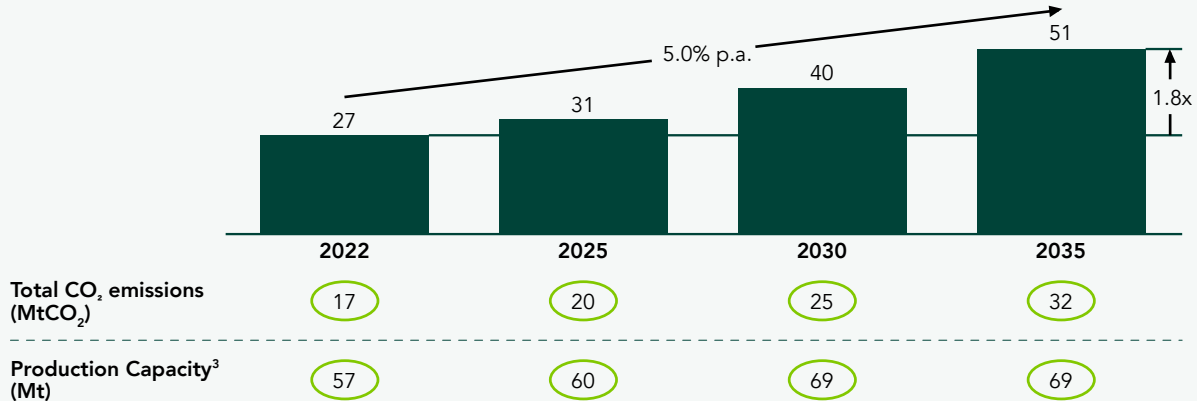
Identifying the clinker and cement manufacturing stage as the primary source of CO₂ emissions, Olamide outlined three categories of potential solutions: traditional process improvements, material or product substitutions, and new technology adoption. Analyzing these options, she identified waste-to-energy initiatives as the most feasible for Nigeria due to their high emission reduction potential and potential cost savings.

She highlighted agricultural and municipal solid waste as the most promising feedstock for alternative fuels, considering factors like logistics, affordability, emissions reduction potential, technical suitability, and clinker quality. These waste types could potentially meet a significant portion of the industry's fuel needs in the coming decade. Olamide also addressed critical gaps in the value chains for managing both municipal solid waste and agricultural waste, stressing the need for structured aggregation and efficient utilization of these waste streams.

Cement production in Nigeria is projected to increase ~1.8x by 2035 and CO₂ emissions from the sector could increase proportionally

Business as usual scenario¹

Cement production by top 3 players in Nigeria²
Mt, 2022 - 2035



1. This scenario assumes factors such as fuel mix, clinker to cement ratio and energy efficiency remain at 2022 levels.
2. Annual growth rate of 5% applied, based on weighted average historical growth rate of Dangote, BUA and Lafarge sales
3. Based on public statements, Dangote expected to launch 6Mt plant in 2026 and BUA expected to launch 3Mt plants in 2025 and 2029

Source: Company websites (Dangote, Lafarge, BUA), Prospects+ Model, Press Search, GNR database

To address these challenges, she proposed two key projects:

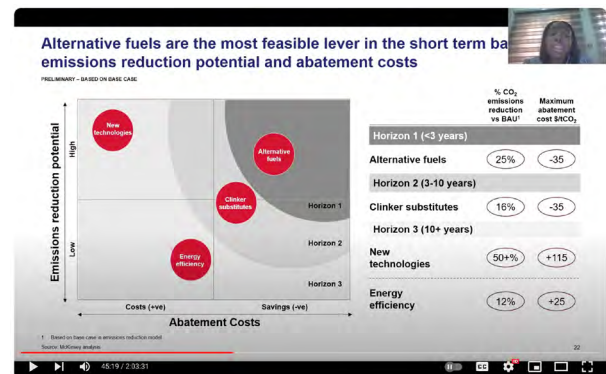
- **Establishment of Material Recovery Facilities (MRFs):** These facilities would process municipal solid waste for use as fuel.
- **Integrated Biomass Processing Facilities for Agricultural Waste:** These facilities would convert agricultural waste into usable fuel for the cement industry.

These projects require collaboration between various stakeholders, including government agencies, cement manufacturers, private waste management companies, and financiers. She further outlined potential risks associated with these projects, such as equipment mismanagement and market linkage challenges. She also proposed mitigation strategies, including co-financing equipment, implementing monitoring and tracking systems, and providing financial support to farmers. Additionally, she highlighted the need for regulatory frameworks and policies to support waste management activities, especially for agricultural waste, where data and regulations are lacking.

In terms of business models, Olamide presented three options for cement producers to choose from: full integration, partial integration, and full outsourcing,

allowing them to select the level of involvement in waste management that best suits their capabilities and resources.

The session concluded by emphasizing the importance of collaboration among key stakeholders – farmers' associations, cement manufacturers, government agencies, and financiers – to drive the successful implementation of decarbonization initiatives within the Nigerian cement sector.



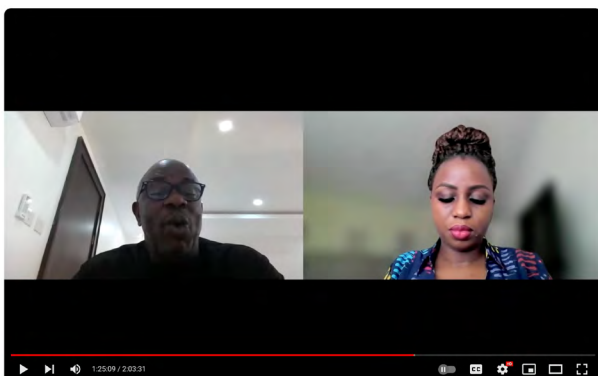
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Interactive Session

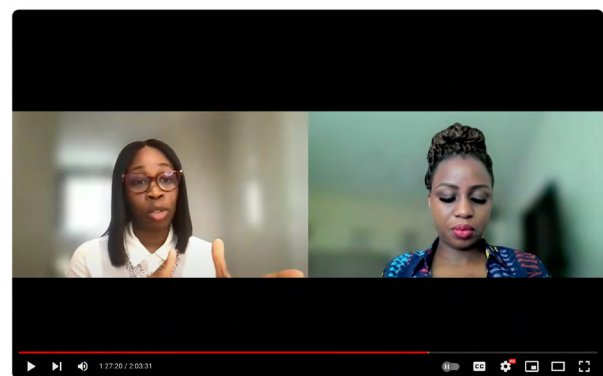
The interactive session led by Kemi Onabanjo provided a platform for deeper understanding.

Here's a summary of key questions and responses:

- a. **Cost Benefits of Alternative Fuels:** A participant questioned data supporting the environmental benefits of alternative fuels. Kemi Onabanjo suggested focusing on the financial advantages, as cost-effectiveness might be more persuasive for cement manufacturers.
- b. **Calcined Clay Availability:** Participant sought details on the local availability of calcined clay as a clinker substitute. We confirmed kaolin as the required mineral and assured its presence across various Nigerian states.
- c. **Carbon Capture Technology Policy:** Questions arose regarding policy implementation for carbon capture technology. Michael discussed the formation of an intergovernmental committee finalizing regulations by June, paving the way for its adoption in Nigeria.
- d. **Academia-Industry Collaboration:** We highlighted the importance of collaboration between academia and industry. We emphasized the need for practical partnerships to institutionalize decarbonization efforts and facilitate knowledge sharing.
- e. **RDF Processing Machinery:** Concerns were raised about the availability of machinery for processing refuse-derived fuel (RDF). We acknowledged the complexity of import duty waivers but suggested a balanced approach that incentivizes local production.
- f. **Stimulating Local Waste Management:** In response to queries about stimulating the local waste management industry, we stressed the need for guaranteed uptake by the cement industry to prevent reliance on cheaper imports and ensure sustainable growth.



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Presentation II

Kemi Onabanjo, Associate Partner at McKinsey presented a comprehensive plan for decarbonizing Nigeria's cement industry. This plan focuses on four key "levers" and a crucial "enabler" for success:

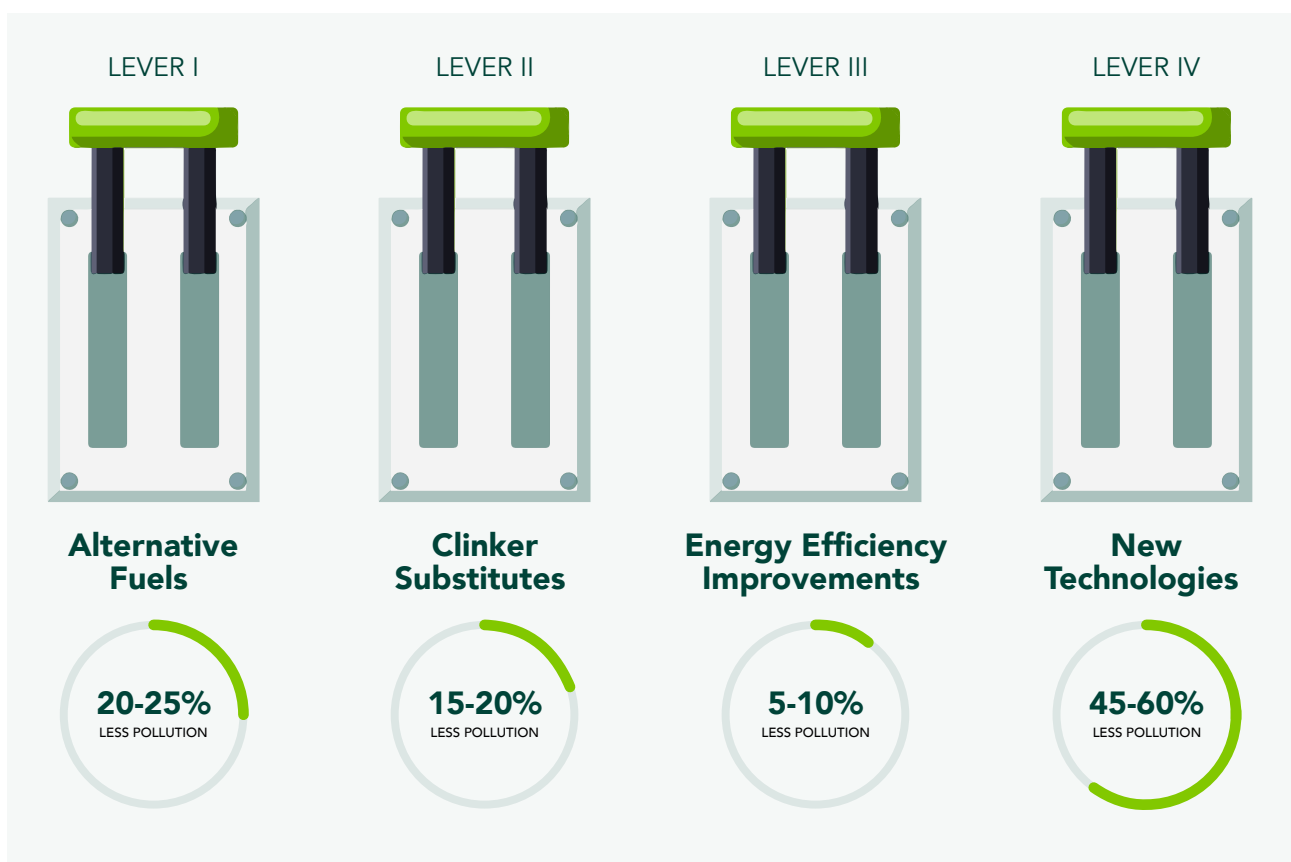
1. DECARBONIZATION LEVERS

Alternative Fuels (20-25% Emission Reduction): Accelerate existing initiatives, build stakeholder cooperation, and secure waste availability for processing biomass and recovering materials.

Clinker Substitutes (15-20% Emission Reduction): Invest in research and development (R&D) for lower-carbon cements and secure access to raw materials for these substitutes.

Energy Efficiency Improvements (5-10% Emission Reduction): Analyze opportunities and share best practices among cement manufacturers.

New Technologies (45-60% Emission Reduction): Foster collaborative R&D efforts with other sectors and research organizations to implement these advanced technologies.



2. KEY ENABLER: STAKEHOLDER COLLABORATION

- Financiers:** Provide necessary investments.
- Government Agencies:** Develop supportive policies.
- Cement Manufacturers:** Actively participate in the transition.
- Waste Management Players:** Ensure efficient waste collection and processing.
- Industry Associations:** Coordinate efforts and share knowledge.



3. BEYOND COLLABORATION

- a. **Public Awareness:** Promote proper waste management practices at both household and industrial levels.
- b. **Financial Incentives:** Government incentives and industry actions are crucial for commercial viability.



Challenges



1. Calcined Clay Adoption

- a. **Process Adjustments:** Integrating calcined clay into existing production lines can be complex and expensive, requiring costly modifications.
- b. **Colour Concerns:** Calcined clay substitution may alter the final cement color, potentially leading to buyer resistance due to aesthetic preferences.

2. Biomass Utilization

- a. **Fragmented Management:** The absence of a centralized biomass collection and management system creates logistical complexities and drives up operational costs.
- b. **Inefficient Sorting:** Poor waste segregation practices lead to commingled municipal and industrial waste, hindering efficient biomass processing.

3. Investment Barriers

- a. **High Capital Costs:** Large upfront investments (CAPEX) are required for implementing zero-carbon technologies, potentially discouraging companies from adopting sustainable alternatives.

- 4. **Rapid Industry Growth:*** Nigeria's cement production capacity is projected to double by 2035. This rapid expansion necessitates urgent decarbonization efforts to prevent a proportionate rise in emissions.

5. Waste Management Woes

- a. **Decentralized Management:** The fragmented institutional structure for managing municipal solid waste creates coordination challenges and reduces overall efficiency.
- b. **Policy Gaps:** The lack of comprehensive national policies and regulations regarding waste management hinders effective decarbonization initiatives.

These challenges highlight the need for innovative solutions, collaborative efforts, and supportive policy frameworks to ensure a successful transition towards a more sustainable cement industry in Nigeria.

Opportunities

Despite the challenges, Nigeria's cement industry has a window of opportunity to embrace a more sustainable future. Here are some key prospects:

1. **Co-financing and Monitoring:** Implementing equipment co-financing schemes with built-in monitoring and tracking can deter equipment misuse and ensure efficient utilization.
2. **Streamlining Biomass Management:**
 - a. **Centralized Processing:** Establishing centralized collection and processing services can streamline biomass management, creating a reliable and efficient supply chain for cement manufacturers.
 - b. **Job Creation:** This shift towards waste-derived and alternative fuels can create new employment opportunities in maintenance, biomass collection, and distribution.
3. **Addressing Buyer Concerns**
 - a. **Stakeholder Education:** Increased stakeholder engagement and education programs can address buyer concerns about potential colour variations in cement caused by material substitutions.
4. **Financial Support:** Financial incentives like concessional loans and carbon credits can act as catalysts, stimulating investment in advanced decarbonization technologies and waste management initiatives.
5. **Local Material Substitutes:** Utilizing readily available materials to replace limestone in cement production fosters a circular economy, creates business opportunities for local suppliers and waste management players, and leads to further job creation.

By capitalizing on these opportunities and addressing the existing challenges, Nigeria's cement industry can pave the way for a more sustainable and environmentally friendly future.

Key Takeaways



The session underscored the critical need for a two-pronged approach: changing both industrial processes and company mind sets towards decarbonization. Three key strategies were highlighted for reducing carbon emissions in the cement industry:

1. **Feedstock substitution:** Replacing traditional materials with alternatives like calcined clay.
2. **Bioenergy deployment:** Utilizing biomass as a fuel source.
3. **Carbon Capture and Storage (BECCS) with low-carbon heating alternatives:** Capturing and storing CO₂ emissions while transitioning away from fossil fuels for heating purposes.

The session emphasized the importance of several tools to ensure successful implementation:

1. **Public awareness campaigns:** Educating the public on the importance of decarbonization.
2. **Partnerships:** Collaboration between stakeholders across sectors.
3. **Stakeholder engagement:** Active involvement of all key players.
4. **Developing a strong commercial value proposition:** Highlighting the economic benefits of decarbonization.

Material substitution was identified as a cost-effective and relatively easy way for companies to begin their decarbonization journey, requiring minimal retraining or process adjustments. Notably, waste-to-energy initiatives were identified as the most feasible decarbonization option for immediate implementation in Nigeria.

The Society of Cement and Concrete Researchers in Nigeria was acknowledged for its contributions, and two key action points were identified:

- **Facilitating ETO's presentation to industry practitioners:** Spreading awareness and knowledge about decarbonization strategies among cement industry players.
- **Making decisions regarding academia involvement:** Determining how best to integrate academic expertise into the decarbonization efforts.

By implementing these strategies and fostering collaboration, Nigeria's cement industry can move towards a more sustainable future.

