



SD STRATEGIES

People. Planet. Purpose.

Building Net-Zero: Decarbonizing the African Cement Sector

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Webinar organized by the African Climate Action Partnership (AfCAP),
in cooperation with SouthSouthNorth, UNOPS, Global Climate Action Partnership, and SD Strategies
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Outline

- Who we are and what we do
- Why cement, why Africa, why now?
- Across continents: African vs. worldwide trends
- Across Africa: Subregional trends
- Technical decarbonization levers
- Cement Decarbonization Roadmap methodology
- What's next?

Who we are and what we do

Who we are

- SD Strategies GmbH is a **policy and communications** company supporting public and private clients around the world.
- Headquartered in Berlin, Germany, we offer a **global network of thought leaders and experts.**

SDS focusses on **solutions** for **sustainable development**, **sectoral transition**, and **deep economic and social transformation.**

- Our work is guided by the **2030 Agenda's** UN Sustainable Development Goals and the UN Framework Convention on Climate Change and its **Paris Agreement.**

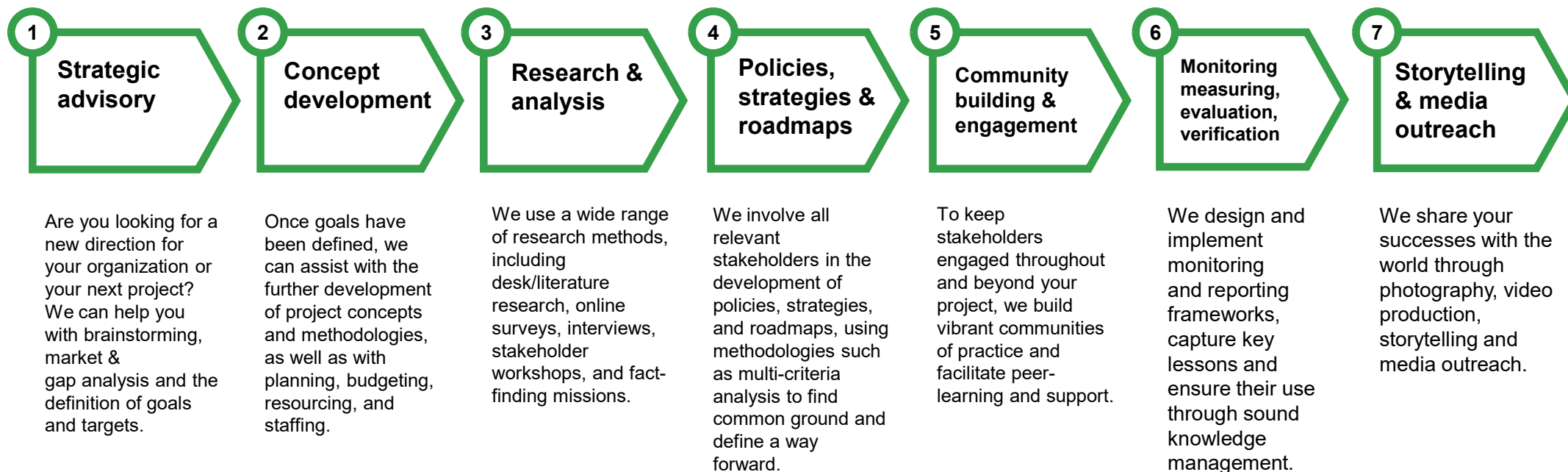
What we do

- People. Planet. Purpose. Modern **problems** and crises open the door for new **opportunities**. Challenges and solutions impact every geographic level from the local to the global, multiple economic sectors and players, and ultimately, all groups and individuals.
- Social development, economics, and the environment. At SD Strategies, we believe that smart and successful decision-making on the most pressing 21st century challenges needs to address **all dimensions of sustainability**.
- Our core areas of expertise include:
 - just economic and sectoral transitions;
 - sustainable development governance and innovation;
 - green deals and taxonomies;
 - climate change mitigation and adaptation; and
 - sectoral transformations: clean energy, sustainable mobility, net-zero industry policy and finance.

How we work

- We take a **systemic, whole-of-society approach** because current crises exacerbate existing inequalities and threaten to undo decades of progress; addressing them systematically opens opportunities to **build forward better**.
- **We tailor our approach to our clients' needs** and respond and adapt quickly to new developments; we offer them a **full range of services** from brainstorming and project design to planning, implementation, monitoring & evaluation, reporting and media outreach.
- We anchor our work in **in-depth analysis of trends, measurement and evaluation, learning, and best practices**.
- We apply **innovative, new methods** and tools.
- We deliver **impact-oriented, actionable** and **accessible** products such as reports, policy briefs, strategy documents, and film.
- Besides our core team, we often bring in **experts from our global network** when projects demand additional capacity or specific expertise.

What we offer



Our Africa projects (selection)

- Africa **Mini-Grids Community of Practice** (AMG-CoP) – SSN/NREL/USAID/GIZ
- **Community power** for Africa: **Funds evaluation** and design (8 countries) – FS/KfW/GIZ
- **NDC** support and **LTS** evaluation (Sierra Leone, Liberia) – NREL/CESC
- **Renewable Energy Policy** & Framework for Advancing Transboundary RE Movements (EAC) – EACREE/WWF
- **Vertical policy integration** & stakeholder engagement (Kenya) – NDC Cluster
- RE & **energy efficiency** policies (Sierra Leone) – CESC
- Derisking **interconnected PV mini-grids** (Nigeria) – UNDP/GEF
- Just **off-grid** energy transition (Mozambique) – EU/GIZ

Uzbekistan cement decarbonisation roadmap

- UNDP-supported work in progress
- Roadmap for short-, mid- and long-term transition of the cement sector
 - Technical, socio-economic, and financial needs assessment → policy, regulatory and finance toolkit
 - Interesting case: Old legacy vs. newer Chinese-built plants
- Stakeholder engagement process
- Close cooperation with top governmental offices
- Finalization in Fall 2026

Why cement, why Africa, why now?

Why?

WHY CEMENT?

- **The world's most emission-intense industrial material – responsible for ~8% of global CO₂**
- Second-most-used substance on Earth after water (~30 Gt/yr)
- Demand rises alongside development: buildings, roads, all key infrastructure

WHY AFRICA?

- African annual cement demand is projected to rise 230% by 2050
- By 2100, Africa becomes the single largest cement producer on Earth
- **80% of Africa's building stock in 2050 is not yet built — a rare low-carbon 'leapfrog' window**

WHY NOW?

- Plants last 40+ years – decisions made this decade lock in emissions to 2060
- Paris alignment: Sector emissions intensity must be halved by 2030
- Development mandate: Africa must build
- **The steepest emissions growth curve of any African industry lies directly ahead of it.**

The World's Hardest-to-Abate Material

8% OF GLOBAL CO₂

Cement alone emits more than aviation and maritime shipping combined

2.4-2.7 GT CO₂ / YR

~1.5 Gt from chemical processing + ~0.9 Gt from energy (fuel + electricity)

60% IS PROCESS

the inherent chemical result of limestone calcination — not solvable by fuel-switching

- As of today, no substitute material at scale for roads, housing, bridges, dams
- The 40% energy share of GHG emissions can be cut with efficiency & clean fuel — but the 60% process share needs new material and/or carbon capture
- Novel binders, supplementary materials (SCMs) and CCUS are all required to reach net zero



Raw Material Extraction | Concrete Plant

1. Heavy machinery excavates essential minerals like limestone and clay



Grinding Mill | Cement Storage | Shipping

4. Finished clinker is ground into a fine powder in a cement mill, stored in specialized silos, and loaded for bulk distribution



Crushing | Milling | Raw Mix

2. Heavy-duty transport vehicles deliver minerals to plant crushers and raw mills to create a fine powder



Kiln | Clinker | Clinker Cooler

3. The fine powder is thermally processed in a rotary kiln at temperatures up to 1450 degrees Celsius (clinkerization), forming hard clinker nodules that are then sent through a cooler

Sources: New Mexico Bureau of Geology and Mineral Resources

The Cementing Process

Across continents: African vs. worldwide trends

Cement production across time

PAST

Driven mostly by Europe & North America

- 20th-century hockey-stick scale-up
- 4× production surge since 1990: ≈ 1 Gt $\rightarrow$ >4 Gt
- $>30\times$ increase since 1950

PRESENT

China produces over half of world output; now peaking

- Massive and plateauing
- Global output ≈ 4.4 Gt/yr (2021–2023 baseline)

FUTURE

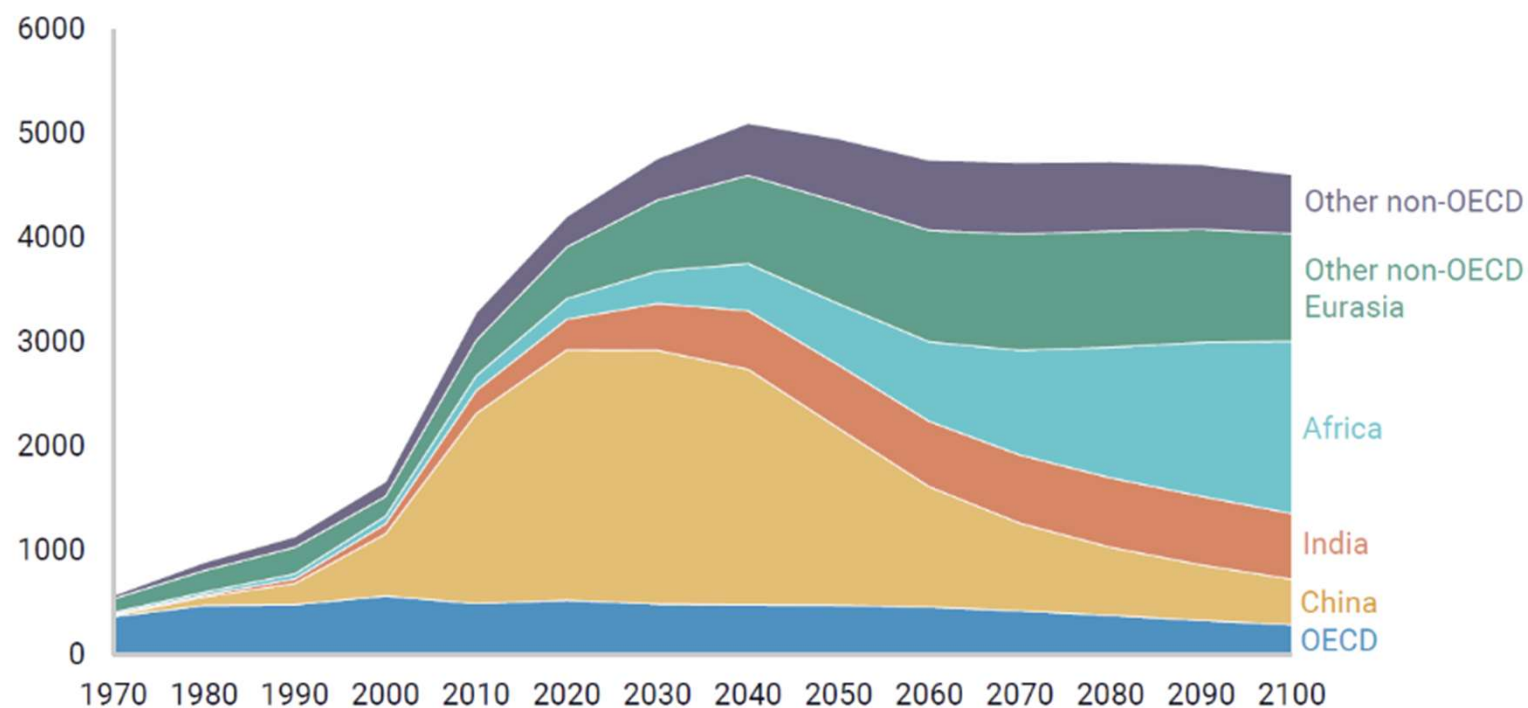
Driven by developing nations: $>90\%$ of increases in Africa & India

- BAU: Global demand rises $\sim 12\text{--}23\%$ by 2050
- Emissions in developing nations could rise from ~ 793 Mt (2020) to $1.4\text{--}3.8$ Gt by 2050

Worldwide consumption is flattening, but shares are shifting from global North to South.

Shifting cement production distribution

(in million metric tons)



Africa's cement demand is projected to increase by 230% by 2050 and 600% by 2100

Africa's cement dilemma – an opportunity!

THE URBANIZATION DRIVE

- Africa hosts the 10 fastest-growing cities worldwide
- Urbanization rate 4%/yr – twice the global average
- Sub-Saharan urban population tripling to 1.14 billion by 2050

THE HOUSING NEED

- Affordable-housing shortage of 50M units today → 130M by 2030
- Low-cost urban housing built primarily with cement and steel
- The human cost of NOT building is measured in slums

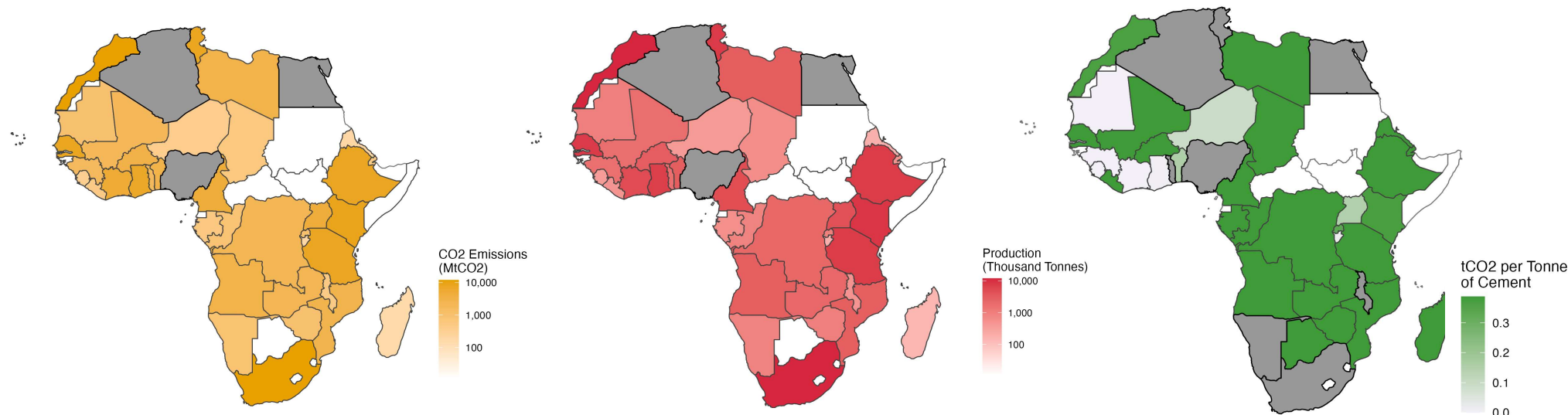
THE CARBON BIND

- Cement & concrete generate ~60% of a typical building's embodied emissions
- BAU: African cement emissions grow from 200 Mt to 1.2 Gt p.a. by 2100
- aggressive decarbonization measures can prevent this

80% of the building stock Africa needs by 2050 is not yet built — a one-time 'leapfrog' opportunity

Across Africa: Subregional trends

Cement Production, Carbon Emissions, Carbon Intensity (2024) *grey = outliers



Production, emissions and efficiency don't line up. The problem is *how* cement is made, not just how much.

Country-specific production & emissions

Country	Production (kt)	Growth '18-'24	Process CO ₂ (Mt)	Intensity (tCO ₂ /t)	
1. Egypt	50,000	-3.85%	27.6	0.55	North Africa
2. Algeria	28,000	+12%	12.8	0.46	North Africa
3. Nigeria	28,000	+27.3%	10.9	0.39	West Africa
4. Morocco	12,000	-10.3%	4.38	0.37	North Africa
5. South Africa	12,000	-12.3%	5.63	0.47	Southern Africa
6. Kenya	8,853	+46.8%	3.6	0.37	East Africa
7. Senegal	8,000	+47.8%	3.1	0.39	West Africa
8. Tanzania	7,598	+70.4%	2.94	0.39	East Africa

Source: [Zenodo](#) — Global CO₂ from cement, [USGS](#)

Top 5 producers = 67% of cement output, 58% of emissions. North A. and S.A. dominated the past. Current growth strongest in large countries of East and West. Newcomers cleaner b/c of newer technologies.

Preliminary insights: North Africa

- Africa's largest producers (Egypt 50 Mt, Algeria 28 Mt); but flat/declining demand (Egypt –3.85%, Morocco –10.3% YoY)
- Per-capita consumption at European levels (435 kg)
- Emissions-heavy/clinker-locked; plants are restarted (Egypt) rather than retired Abundant solar & strong wind resource
- Existing decarbonization plans and industrial roadmaps
 - UNIDO Morocco roadmap, Egypt low-carbon roadmap & Energy Efficiency Plan: make efficiency + fuel-switching/electrification the natural path
 - Morocco hosts the continent's only CCU project

Sources: [UNIDO — Morocco Industrial Decarbonization Roadmap](#), [Research & Markets](#), [Zenodo — Global CO₂ from cement](#)

Very high decarbonization potential.

Thesis: Mostly, plant **retrofits** will dominate the decarbonization path. But: Assessments where new plants will be cheaper required.

Preliminary insights: West Africa

- Sub-regional urban growth exceeds 4.1% annually, demand rises at > 4%/yr
- Nigeria largest producer by far
 - Three firms — Dangote (60–65%), BUA, Lafarge — control ~99% of production
 - Producers built their own fossil power plants: ~60% of the cost base; invisible to any grid-decarbonization policy
- Senegal (~330 kg), Ghana (~235 kg), lead regional consumption per capita, well above the Sub-Saharan average (131 kg)
 - Francophone hub growth is sustained by PPP-led urban redevelopment and port upgrades;
 - Ciments du Sahel and CIMAF drive regional export flows
- Massive overcapacity suppresses plant utilization to ~46%, dropping as low as 22% in Nigeria
- Coastal limestone scarcity; many countries remain net clinker importers
- AfCFTA and ECOWAS integration are unlocking logistics efficiencies, harmonizing regional cement standards and easing cross-border clinker movement

Source: [CemBR West Africa](#), [African Cement Blueprint](#), [Research & Markets](#)

Very high decarbonization potential.

In large producing countries, plant **retrofits** will dominate the decarbonization path.

→ What will **smaller countries with greatest catch-up potential** do?

Preliminary insights: East Africa

- The fastest-growing sub-region: US\$6.3 bn sectoral investment across 77 projects, led by Ethiopia, Tanzania, Kenya & Uganda — tied to EAC transport-corridor and port upgrades
 - Kenya Compound Annual Growth Rate 10.3% (2021–25); Becoming a clinker exporter to Uganda & Rwanda
 - Tanzania CAGR 9–11%/yr, heading to ~15 Mt capacity by 2028
 - Ethiopia grew 15→25 Mt over the last decade
- Home to the continent's only real regional body — the East Africa Cement Producers Association (Kenya, Uganda, Tanzania)
- Kenya: Low emissions-intensity (~0.39 tCO₂/t) thanks to newer plants
 - Early SCM adoption, waste co-processing, and geothermal-powered low-carbon pathways (Mombasa Cement)
 - BUT: ~39% overcapacity, ~64% utilization, coal still met 46% of industrial energy in 2020, and there's no national MRV platform — so gains rely on voluntary corporate goodwill

Proof that a credible trajectory is possible when leading firms + mature climate policy align
But: East Africa is decarbonizing power (geothermal) faster than it is decarbonizing kilns – process emissions are the harder half

Preliminary insights: South(ern) Africa

- A mature, low-growth market. South African demand 7.9–8.5 Mt despite CAGR growth of 3-4% to 2027; production fell 12% between 2018 and 2024
 - Standards-focused and historically the continent's most utilized (once at 94% capacity utilization)
 - Runs at ~59% capacity utilization while imports undercut it — a zero-rated WTO tariff trap lets high-carbon Vietnamese cement in with no carbon cost
- PPC and AfriSam anchor SACU/SADC distribution networks reaching Mozambique, Zambia, Angola, DRC, Tanzania
- The defining threat:
 - Cheap imports, priced up to 40% below local cement, carrying zero carbon penalty at the border
 - Carbon tax effects domestic producers but not importers — climate rules that export production, not emissions

Source: [Research & Markets](#), [GIBS / PPC socio-economic study](#), [African Cement Blueprint](#)

Modern plants coexists with 1965-vintage coal kilns
Carbon leakage: without a border carbon adjustment, national climate rules just move production abroad

One Continent, Four Industries

NORTH AFRICA

Mature · emissions-heavy · clinker-locked · flat demand.

Decarbonization: retrofit

WEST AFRICA

Fast growth · high clinker imports · oligopolies.

Enormous transition chance

SOUTH AFRICA

Mature · slow growth · cheap imports.

Already employs standards.

EAST AFRICA

Fast recent growth · export-oriented ·

Policy and roadmaps still forming

Source: [World Bank — SSA Cement Sector](#), [CemBR](#)

Caution: Trends often ambiguous; National and subregional projections scarce and date often unclear.

Technical decarbonization levers

The Technical Toolkit: Two Major Decarbonization Levers

1 | Energy-targeted (35–40% of CO₂)

- **Efficiency:** dry-process kilns, preheater/precalciner, vertical roller mills, AI control
- **Waste-heat recovery:** recovers ~20–30% of plant power
- **Alternative fuels:** RDF, tires, biomass. EU plants reach up to 52% substitution; SSA is at most ~20%, mostly still coal
- **Electrification:** Electric calcination (ELECTRA), plasma & hydrogen kilns, solar-based kilns

2 | Cement/process-targeted (60–65% of CO₂)

- **Clinker substitution/SCMs:** single largest lever, 37% of 2050 savings; fly ash, slag, limestone; LC3/calced clay
- **Alternative raw materials:** ~2% reduction potential
- **Novel binders:** CSA, Solidia, geopolymers, Sublime, Brimstone, Fortera
- **CCUS:** ~36% of the remaining abatement: amine capture (~90–95%), oxyfuel, calcium looping, LEILAC direct separation, CarbonCure mineralization

What Africa has vs. what Africa needs

	Africa HAS	Africa NEEDS
1 Energy	Some dry-process kilns; almost exclusively run on fossil power	- Short-term retrofits: Waste-heat recovery at scale; alt-fuel supply chains - Long-term electrification: grid, solar, wind, hydrogen
2 Process	LC3/calclined-clay leaders (e.g., Ghana, Burkina Faso, Côte d'Ivoire); abundant SCMs: volcanic ash, slag, rice-husk ash, waste materials	- Short-term: Performance-based standards to make low-clinker cement legal & bankable - Mid-term: Local SCM supply chains - Long-term: CCUS or supplementary material

The Cement Decarbonization Roadmap methodology

Incentivizing best available technologies (BAT) with best available policies (BAP) and best available finance (BAF)



Policy architecture

- 1. Performance standards — replace composition-based codes so LC3 & novel binders become legal and bankable
- 2. Green procurement — governments (15–30% of GDP) mandate low-carbon cement to guarantee demand
- 3. Carbon price + shared infrastructure — price coal so clean CAPEX pays back; co-invest in alt-fuel/waste supply chains
- 4. National MRV — make it all measurable and enforceable (Kenya's missing piece)

Technology sequencing

NOW · no-regret

Run kilns efficiently (dry process, preheater/precaliner, VRM, AI control) + maximize SCM / LC3 substitution — the cheapest, biggest wins, and Africa already leads

NEXT

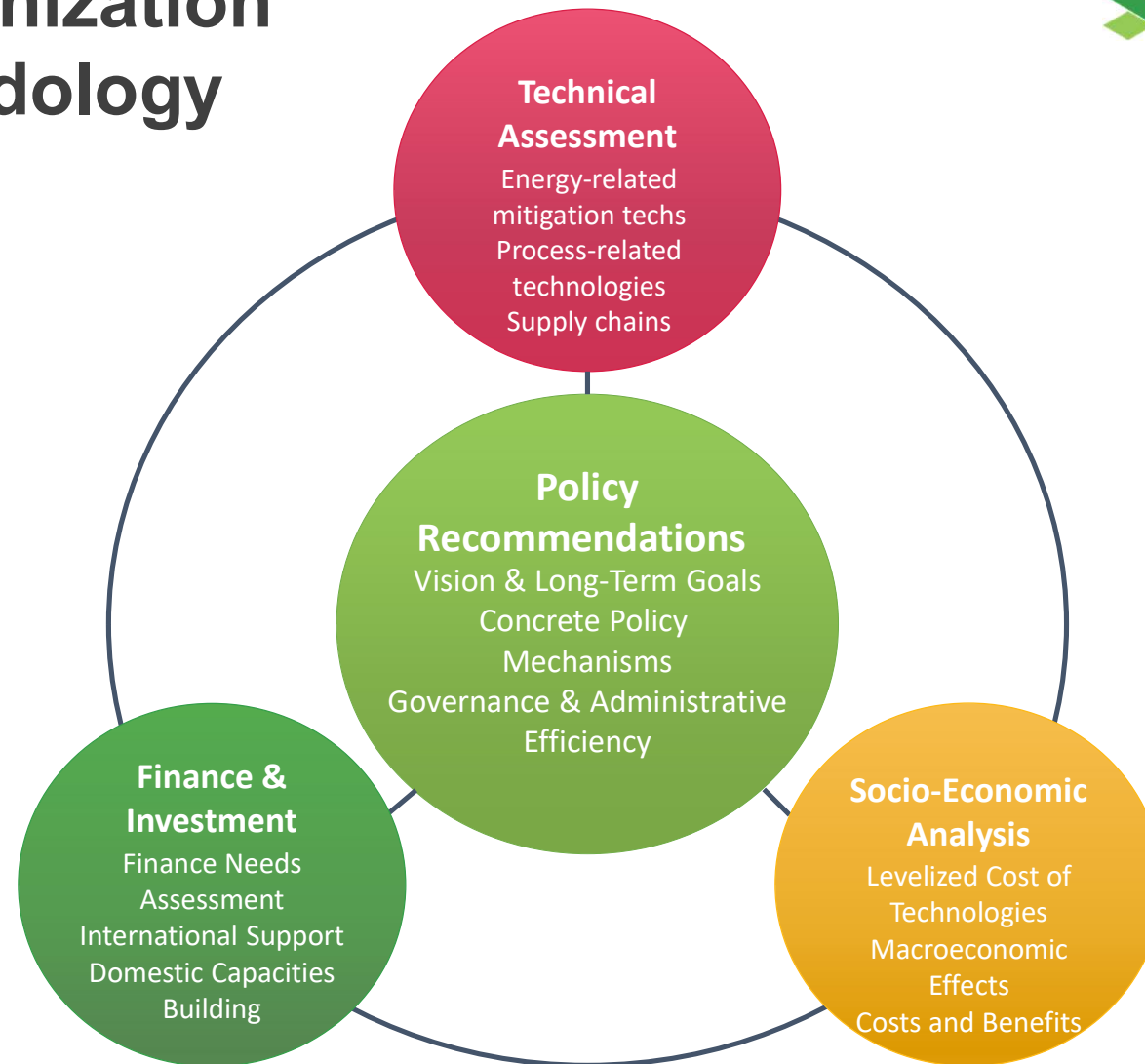
Alternative fuels + waste-heat recovery; solar & grid electrification where power is the bottleneck

LATER · frontier

Novel binders + CCS for the residual process emissions that substitution alone can't reach

Technology exists. The window is the policy. Get the architecture right, then sequence the tech by best-use and affordability.

Cement Decarbonization Roadmap Methodology



What's next?

What's next

Identified research gaps

- **Country-level production & demand projections** are thin: Most trends forecasts (e.g., Rhodium) are global/continental; sub-regional forecasts (CemBR, WCA) end in 2030 and are only partial. **Need: harmonized country production trajectories to 2050**
- **Emissions-accounting** inconsistency — process-only vs process+energy, reported differently across sources. **Need: one consistent basis**
- **Sub-regional sectoral decarbonization pathways** unavailable. **Need: Consistent technical assessments**
- Opaque **plant-level data**: **Need: Plant surveys, MRV protocols.**
- **No consistent, holistic, systemic analysis** at the sub-regional and country levels; **Needed: Cement Decarbonization Roadmaps**

Stakeholder understanding and engagement will be key

- **PITCH: Let us start an Africa Cement Decarbonization Community of Practice (ACDC)!**

Summary & Contacts

Africa's cement is going to grow. Whether it grows clean is a policy choice made this decade. The building technology is ready, the living conditions are clear, the architecture is lacking.

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