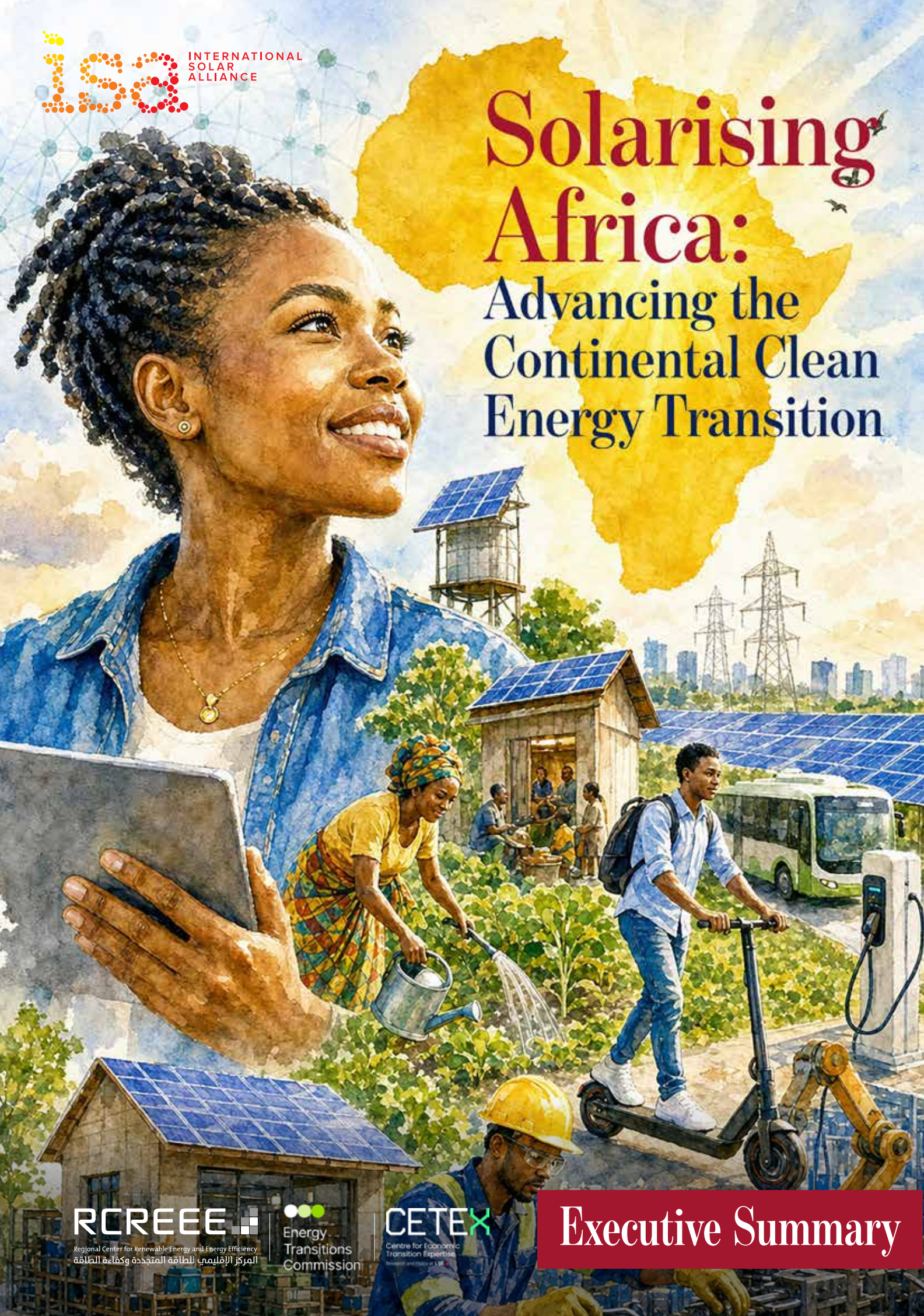
INTERNATIONAL SOLAR ALLIANCE

Solarising Africa:

Advancing the Continental Clean Energy Transition



RCREEE
Regional Center for Renewable Energy and Energy Efficiency
المركز الإقليمي للطاقة المتجددة وكفاءة الطاقة

Energy Transitions Commission

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Africa's solar moment has arrived. What makes this moment different is not simply the continent's extraordinary solar resource, but the convergence of falling technology costs, unprecedented political commitment, rapidly expanding markets and an urgent imperative for energy security. With Mission 300 providing an integrated framework of national commitments and delivery, the foundations are emerging to mobilise private capital and build local capabilities at scale.

The continent possesses 60% of the world's solar resources, yet around 660 million people continue to live without reliable access to electricity, while economies bear the high costs of unreliable and carbon-intensive energy systems. At the same time, Africa's population, cities, industries and energy demand are expanding rapidly. The choices made today will therefore shape not only the continent's energy future, but its economic competitiveness, resilience and prosperity for decades to come.

Solar energy can be at the heart of this transformation.

The economics of solar have changed fundamentally. Technology costs have fallen by 90%, deployment models have diversified, and solar is increasingly capable of delivering not only affordable electricity, but reliable and productive energy for communities, agriculture, mobility and industry. Yet Africa's solar deployment remains far below the scale warranted by its resource endowment and development needs. The challenge is no longer whether solar works. It is whether we can build the policies, institutions, financing systems and capabilities that allow it to work at scale.

Solarising Africa: Advancing the Continental Clean Energy Transition addresses this critical question. It moves beyond describing Africa's solar opportunity to examine what it will take to translate that opportunity into deployment. Anchored in the commitments of Mission 300 and the National Energy Compacts, the report provides a practical, delivery-oriented framework for accelerating solar across the continent. Its focus is deliberately broader than generation alone—from distributed renewable energy and solar-powered agriculture to electric mobility, utility-scale solar and regional interconnections, supported by the cross-cutting foundations of digitalisation, institutional capacity, finance and local manufacturing.

A central message emerges clearly: **Africa's solar transition must be understood as one interconnected system.** A solar panel alone does not create development. A connection becomes transformative when it powers a farm, a cold chain, a small enterprise, a school, a health facility or a vehicle. A solar project becomes sustainable when it is supported by a creditworthy utility, appropriate financing, capable institutions, skilled people, reliable data and a functioning local ecosystem. The report's case studies, from Nigeria's distributed access programme and Uganda's solar-agriculture experience to Egypt's utility-scale development and emerging solar e-mobility models, demonstrate that solutions already exist within Africa. The task now is to scale, adapt and connect them.

This is where **Mission 300 represents a historic opportunity.** With countries having already articulated national commitments and established mechanisms for monitoring delivery, Africa has an unprecedented platform for moving from fragmented initiatives towards coordinated implementation. What is required now is to convert these commitments into bankable pipelines, strengthen delivery institutions, reduce the cost of capital, build modern and digitally enabled utilities, develop the workforce of the future and create regional markets capable of supporting investment and industrial scale.

The International Solar Alliance is committed to being a partner in this journey. Through catalytic finance, technical assistance, capacity-building platforms such as the STAR-C network, Communities of Practice, and stronger regional cooperation, ISA seeks to help countries move from successful individual projects to scalable models that can be replicated across markets. Our ambition is not simply to support more solar projects, but to help build the enabling architecture that makes solar deployment faster, more affordable, more inclusive and more sustainable.

The opportunity ahead is immense. This report envisages a pathway towards approximately **1,000 GW of solar capacity in Africa by 2050,** with solar becoming a much larger share of the continent's electricity system. Achieving this will require a sustained effort across governments, development finance institutions, private investors, technology providers, utilities, regional institutions and communities. Most importantly, it will require a shift from seeing solar as an energy technology to recognising it as an instrument of economic transformation.

Africa has the sunlight. It increasingly has the technology. It now needs the systems, institutions and partnerships to turn both into power, opportunity and prosperity.

Solarising Africa is therefore not only a report on what is possible. It is initiation of a programmatic commitment with African countries and partners to turn this ambition into delivery, **to develop policy and project pipelines for enabling potential investment through a digital dashboard,** thereby ensuring that Africa's solar future becomes a foundation for a more prosperous, resilient and inclusive continent.

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Executive Summary

Africa possesses the world's best solar resource, but it is also the continent with the highest electricity access deficit. Around 600 million people in Sub-Saharan Africa live without electricity, and close to a billion without clean cooking. The continent is already paying for that gap: an estimated 2–4% of GDP is lost every year to unreliable power, before a single new panel is installed. The status quo, not solar, is the expensive choice.

The deployment record is starker than the deficit itself. Total installed solar PV capacity across Africa at the end of 2025 was about **22.2 GW,** and **14 GW** of this capacity sits in two countries, some **0.33%** of global installed capacity. Of the **USD 521 billion** invested in solar worldwide in **2024,** only **2%,** or **USD 9 billion,** reached Africa. The cost of capital for clean-energy projects on the continent still runs at two to three times that of advanced economies.

This report treats the case for African solar deployment as settled. It is a working guide to converting ambition into action, written for the stakeholders and actors who must now deliver the commitments their nations have already made.

1.1 Why this moment is different

Reports on solar in Africa are not new. What is new is that five conditions have changed at once and together they have opened a window that will not stay open for long.

- **Solar became the cheapest option and then it became firm.** Africa's weighted-average levelised cost for utility-scale solar fell **67% between 2015 and 2024, from USD 225/MWh to USD 74/MWh.** Storing half a plant's daytime generation now adds to roughly U**SD 33/MWh,** giving dispatchable solar at about **USD 76/MWh.** Lithium-ion pack prices are down **93% since 2010** to around USD 100/kWh. Solar has crossed the threshold from cheap and intermittent to cheap and dispatchable.
- **Demand has become visible for the first time.** Forty-eight countries have endorsed the Dar es Salaam Energy Declaration, and **35 governments have published National Energy Compacts** under Mission 300 carrying baseline-to-2030 targets. Africa's reform and equipment demand is now written down, comparable across borders and formally monitored, a precondition for planning that simply did not exist three years ago.
- **The market is already moving without waiting for permission.** Africa imported roughly **18.8 GW of solar panels in 2025, 48% above 2024;** excluding South Africa, imports **tripled in two years.** Twenty countries set import records in a single year, and deployment is no longer a two-market story.
- **Energy security has become a treasury question.** Transport fuel imports average **23% of merchandise imports** across Sub-Saharan Africa. When global oil markets were disrupted in early 2026, the effect reached African pumps within weeks. Electrification is now a fiscal and macroeconomic argument, not only an energy-ministry one.

- **The infrastructure is not yet locked in.** Africa's urban population will double from 700 million to 1.4 billion, and vehicle ownership remains **below 30 per 1,000 people against 210 in China.** Decisions taken this decade will decide whether that growth is electric or fossil-fuelled.

The binding constraint is therefore no longer technology, resource, or even the existence of capital. It is narrower and harder: how policy is designed, how financing is structured, how well institutions can plan and procure, and whether they can then deliver, which is the subject of this report.

1.2 What this report does differently

Most analytical reports on African solar establish the opportunity and stop at the threshold of implementation. This one starts at that threshold, structured around five choices about how the report is put together:

- **It begins from commitments that already exist.** Every thematic chapter is anchored to the National Energy Compacts and states plainly what has been committed, what is in place, and what the gap between the two requires. The report helps governments deliver the agenda they have already signed, rather than asking them to adopt a new one.
- **The organising principle is delivery, not technology.** Each chapter runs the same structure: why it matters for Africa, what is blocking it, what Mission 300 already commits and where the gap lies, the priority enablers, and a roadmap. A reader can enter at any chapter and find the same architecture.
- **Every recommendation carries an owner and a horizon.** Each roadmap sets out what needs to be done, who needs to act, and by when, sequenced across immediate, medium-term and long-term horizons. Each action is assigned to a named actor: head of state, line ministry, regulator, compact delivery unit, utility, financier or private developer.
- **The cross-cutting enabler chapters are treated as part of the consolidated Solarising Africa structure.** Digitalisation, capacity building, financing and manufacturing form the conditions on which all four delivery chapters depend, rather than a closing section, and each is written to be read against every one of them.
- **Africa is not treated as a single market.** Access rates range from under 20% to above 90%; some systems are grid-dominant, others distributed-led; regulatory traditions, languages and fiscal space differ profoundly. The report is built to support learning between African markets rather than prescription for Africa.

1.3 Mission 300: from many initiatives to one framework

For two decades, African electrification progressed through parallel but disconnected efforts: national plans, donor programmes, pilot projects and technology-specific initiatives, each running its own targets, baselines, timelines and reporting, because its shape was never visible in the first place.

Mission 300 changes the architecture not the ambition. The joint World Bank Group and African Development Bank commitment to connect 300 million Africans by 2030 has moved from declaration to delivery machinery: 48 countries have endorsed the Dar es Salaam Energy Declaration, and 35 National Energy Compacts have been published across three waves. Each compact is a government-signed reform roadmap with hard baseline-to-2030 targets for access, clean cooking, renewables share and private capital and each rests on the same five pillars: competitive generation and grids; regional integration and power trade; last-mile distributed renewables and clean cooking; private-sector participation; and financially viable utilities. A national Compact Delivery and Monitoring Unit delivers each one and reports on it twice a year. Four practical consequences follow, and they are why this report is organised around the compacts. Demand has become **aggregable,** so manufacturers and financiers finally have a pipeline they can plan against. Every commitment has picked up a **monitoring line** that makes slippage visible rather than inferred. And every commitment has an **institutional owner,** meaning there is now somewhere for a recommendation to land.

1.4 Africa is not one market, and the differences are the opportunity

On this continent, the market type is a far more useful unit of learning than 'Africa' as a whole. Settlement geography alone splits every country into three segments, each with a different least-cost answer: dense populations within roughly **10–15 km** of the network are cheapest to reach by extending the grid; small population centres beyond that threshold are best served by mini-grids; and dispersed rural communities are most economically served by standalone systems at about **USD 1,924 per remote household against USD 3,368 to extend the grid, roughly 40% cheaper.**

The same logic holds for policy. African markets are already producing transferable answers, and they serve each other more useful than any template imported from outside.

- **Nigeria** is scaling access through the USD 750 million DARES programme, blending mini-grids, standalone systems and technical assistance into a single reference case for large, distributed-led access markets.

- **Egypt** has unlocked utility-scale investment through bankable long-term power purchase agreements (PPAs) with currency indexation and robust grid integration, the reference case for markets pursuing gigawatt-scale procurement.
- **Kenya** has folded mini-grids, standalone systems, solar irrigation and clean cooking into a single capacity-building framework, the reference case for productive-use-led electrification.
- **Zambia** removed VAT and import duties on solar components, and imports rose roughly eightfold year on year, the reference case for how quickly fiscal signals can move this market.
- **Ethiopia** has drawn energy-intensive manufacturing into industrial parks on the strength of low-cost clean power, the reference case for converting a power advantage into an industrial one.

Peer exchange works best when matched by **market typology** (grid-dominant against distributed-led, high-access against low-access, francophone against anglophone regulatory tradition) not by geographic proximity. Making that exchange routine rather than occasional is one of this report's central recommendations.

1.5 What transfers from elsewhere, and what does not

Countries that have closed large access gaps did not do it with superior hardware. They built an enabling ecosystem, because the acceleration is measurable: **the first 50 GW of solar took 132 months to install , the next 50 GW took 14 months, a nine-fold increase in build rate.** Neither the technology nor the geography changed. Three things did.

- **An institution aggregated demand.** The Solar Energy Corporation of India acted as a central counterparty, running reverse auctions, shifting offtake risk away from individual developers. Tariffs fell to a record **~USD 0.027** in **2020**, and solar-plus-storage cleared at **~USD 0.032** in **October 2025,** evidence that the model now delivers round-the-clock power, not merely cheap daytime solar.
- **Finance was built around the end-user, not the asset.** Under **PM-KUSUM (~USD 4.3 billion),** farmers pay as little as **10% upfront** for a **solar pump,** with blended subsidy and concessional credit covering the rest. **Some 2.67 million pumps** have been deployed, saving an estimated **1.38 billion litres** of diesel and about **40 million tonnes of CO_2** a year and converting diesel consumers into solar producers.
- **Skills and manufacturing were built alongside deployment, not after it,** so the acceleration never hit a workforce or supply-chain wall the moment volumes arrived.

1.6 What the chapters prescribe

Each thematic chapter turns a diagnosis into a set of enablers and a roadmap. In brief:

- **Distributed renewable energy** is the fastest, lowest-cost route to the settlements the grid will not reach economically, and often the only option in fragile and conflict-affected areas. Its problem is cost structure, not resource: African mini grids cost around **USD 6,824/kWp against a global benchmark near USD 3,000,** because equipment is imported and every project is built from scratch. **Every USD 1,000/kWp** saved unlocks about **USD 4.2 billion, ~10 million more connections.** The enablers are clear licensing, defined grid-arrival compensation, cost-reflective tariffs with lifeline protection, productive-use stimulation written into every tender, and a dedicated delivery unit inside the energy ministry.
- **Solar for agriculture** delivers the widest development return of any energy investment in this report. Agriculture accounts for about a third of Africa's GDP and over 60% of its workforce, yet more than 95% of cultivated land is rain-fed and only 4% is irrigated, against 52% in India. Solar irrigation can raise productivity up to threefold while cutting lifetime energy costs **50–74%** against diesel and solar cold chains can cut post-harvest losses by up to **80%.** The enablers are integrated water–energy–food planning, end-user finance, quality standards, and extension services within reach of the farm.
- **Solar-powered e-mobility** is a window, not a trend. Africa's fleet is dominated by two- and three-wheelers, whose modest battery sizes happen to suit distributed solar unusually well, so the continent's highest-volume vehicle segment is also its most commercially viable to electrify. Charging infrastructure, subsidies and standards should be built around that fleet, rather than imported wholesale from four-wheeler markets.
- **Utility-scale solar and regional interconnection** stall on offtaker risk, currency volatility and opaque procurement, not on cost. With more than two-thirds of utilities unable to cover costs from revenue, PPAs are unbankable without scarce sovereign guarantees. The sequence is to restore utility performance, then reform tariffs, then crowd in private capital, supported by escrowed payment streams, partial risk guarantees, standardised PPAs, a published pipeline, and harmonised grid codes for regional trade. Storage and transmission are treated as what they are: enablers of integration, reliability and grid flexibility.
- **Digitalisation** is the cheapest reform on this list. Transmission and distribution losses range from **6.2%** to

What does not transfer matters just as much, and the report says so plainly: India had a single large national market, a sovereign balance sheet able to underwrite offtake, and a deep domestic capital market. Most African economies have none of the three. **The transferable lesson is therefore the sequence, not the scheme:** policy certainty first, then demand aggregation, then end-user finance, with skills and industry built alongside. Where a national market is too small to aggregate meaningfully, aggregation must happen regionally, which is precisely why the African Continental Free Trade Area and the regional power pools appear throughout this report as instruments of delivery rather than as background.

- **38%**, and collection rates from **36% in Guinea to 100% in Niger and Namibia.** Cutting losses to South African levels and closing the collection gap would lift utility revenue by up to **181% and turn 9 of 15 loss-making vertically integrated utilities profitable.** Metering, feeder monitoring, digital billing, e-procurement and geospatial planning are what make every other chapter bankable.
- **Capacity building** surfaced in every consultation for this report as the primary bottleneck: thin technical expertise in ministries and utilities, fragmented mandates, and rules that lag the technology. Africa could generate **2.5 to 4 million solar jobs by 2050,** with technician roles dominating, but only with deliberate investment in technical and vocational education. ISA anchors this through its **STAR-C network, 13 centres operating today, building toward a target of 50 self-sustaining centres by 2030.**
- **Financing** is short of affordable, patient, risk-tolerant capital, not short of capital in general. Africa attracts **3% of global energy investment at two to three times** the advanced-economy cost of capital, and the disbursement gap is as telling as the commitment gap: of **USD 9.1 billion committed to mini-grid electrification, only about 14% has been disbursed.** Closing the gap could unlock more than 33 GW of new solar by 2029. Different market segments need different instruments, and this report matches them explicitly.

1.7 Five imperatives

Across all chapters, five actions determine whether everything else follows.

- **Put policy certainty before project development.** Stable licensing, tariffs and procurement rules are worth more than concessional finance, and cost less to provide.
- **Mobilise affordable finance at scale** through blended structures, guarantees and local-currency instruments, and measure success by disbursement, not commitment.
- **Design for productive use, not connections.** A megawatt is an input to farm income, enterprise formation and a functioning clinic, counting connections measures activity, not outcome.
- **Modernise utilities and institutions** through digitalisation, capacity building and governance reform, because an insolvent utility makes every other reform unbankable.
- **Scale proven African solutions through structured peer exchange,** matched by market type, with governments, private sector, development finance institutions and ISA replicating what already works on the continent.

The table below indicate how the four enablers are linked with the four thematic areas of the report

→ Thematics across ↓ Enablers down	DRE: Last-mile access	Agriculture	e-Mobility	Utility-scale
Digitalisation	Geospatial siting, PAYGo and remote monitoring	Pump telemetry, digital payment and cold-chain data	Telematics, charging management, managed charging	Revenue assurance and SCADA make the offtaker bankable
Capacity building	Regulators who can license a mini grid at speed	Technicians and extension services within reach of the farm	Battery-safety codes, inspectors and mechanics	Procurement teams that can run a competitive tender
Financing	Local-currency working capital and receivables finance	End-user finance, so the farmer can buy the pump	Asset finance for fleets and batteries	Guarantees, FX cover and a lower cost of capital
Local manufacturing	Poles, cabling, meters, balance of system, made locally	Pumps, cold rooms and dryers assembled near the farmer	Battery packs, swap hardware, 2- and 3-wheeler assembly	Mounting steel, transformers and switchgear

1.8 How to use this report

This report is a deployment blueprint. The table below sets out, for each principal actor, where to start and what to take from it.

S.N	Stakeholder	Where to start, and what to take from it
1	**Heads of State and Cabinets**	Treat the National Energy Compact as a delivery contract, not a pledge. Assign the compact to a named minister, give the Compact Delivery and Monitoring Unit authority across ministries, and review the twice-yearly progress report personally.
2	**Energy Ministries**	Start with the roadmaps at the end of each chapter. Convert the immediate-horizon actions into a dated workplan with named owners, beginning with mini-grid licensing, grid-arrival compensation and a published project pipeline.
3	**Regulators**	Prioritise the three rules that unlock private capital fastest: cost-reflective tariffs with lifeline protection, standardised PPAs with defined payment security, and net metering or net billing with clear interconnection rules for rooftop solar.
4	**Finance Ministries**	Read the financing chapter against your own duty schedule and guarantee capacity. Correct tariff inversions where inputs are taxed more heavily than finished goods and extend guarantee instruments beyond generation to offtake.
5	**Utilities**	Begin with the digitalisation chapter. Metering, feeder monitoring, collection and e-procurement are the lowest-cost reforms available and the precondition for a bankable balance sheet.
6	**Compact Delivery and Monitoring Units**	Use the chapter gap analyses directly. Each identifies what the compact commits, what is in place, and which enabler closes the difference — the same structure the progress report already requires.
7	**Development Finance Institutions and Partners**	Target the disbursement gap, not the commitment gap. Prioritise local-currency instruments, receivables and working-capital facilities, and technical assistance to delivery institutions rather than to project preparation alone.
8	**Private Sector: developers, manufacturers, operators**	Read the compacts as an order book. Aggregated across 35 countries, they set out a multi-year, multi-gigawatt pipeline of equipment, services and skills demand now visible enough to plan against.
9	**ISA and Regional Institutions**	Convene by market typology rather than geography. Communities of Practice, STAR-C centres and regional standards work are the mechanisms by which one country's solved problem becomes another's starting point.

1.9 From blueprint to build rate

A flagship report changes a conversation; a delivery platform turns it into build rate. **ISA's Community of Practice** model (one technology, many champions) is designed to put these findings into practice. The first, on the **solarisation of agriculture,** launches with seven founding members: **Uganda, Rwanda, Ghana, Senegal, The Gambia, Ethiopia and Zimbabwe,** each chosen for a distinct lesson the cohort can absorb. Agriculture is the entry point by design: with only 4% of arable land irrigated and Sub-Saharan Africa projected to spend close to **USD 65 billion on food imports in 2025,** early solar-irrigation results show productivity gains of **427% for tomatoes, 571% for onions, 553% for cabbages and 283% for bananas.** Successor Communities of Practice covering utility-scale solar, mini-grids, e-mobility and digitalisation will follow the same operating logic: a defined cohort, a named anchor country, a measurable deliverable and a financier roster.

1.10 The horizon: Tera-Solar for Africa

The destination is aspirational: the African continent running on roughly **1,000 GW of solar by 2050,** lifting solar from about **3% to 40% of total electricity generation,** in three sequential phases: **lay the foundation to 2030** (100–200 GW, built on stable regulation, blended finance and utility digitalisation); **scale systemically to 2040 (~500 GW,** through aggregation, securitisation and connected regional grids); and **consolidate to 2050 (~1,000 GW,** through storage, flexibility and the institutional capacity to run a solar-dominated power system).

The resource is not in question, nor is the technology. What this report sets out is the far narrower set that remains: the policy choices, the financing structures, the institutions and the skills that stand between **Africa's sunlight and Africa's power system. Africa is where the global energy transition will either work or fall short. The chapters that follow set out what making that work looks like in detail.**

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