SUMMARY REPORT · JUNE 2026

Unlocking Africa's Green Transition

Opportunities Towards a Green and Inclusive Workforce

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Africa at an inflection point

Growth shaped by demographics and employment — and defined by inequality and climate risk

~15M

New jobs needed per year in sub-Saharan Africa to absorb labour market entrants

3.3%

Africa's share of **global climate finance flows** in 2021–22, with current flows meeting only 23%of what's needed to implement NDCs

3–4%

Africa's share of global **carbon emissions** despite acute climate change impact

Labour market & structural inequality

Sub-Saharan Africa must create **15 million new jobs** per year simply to absorb new labour market entrants. But current growth patterns are estimated to create only ~3 million formal jobs annually.

90% of young employed Africans work in informal jobs with no social protection, no recognised credential and no progression pathway.

Women will account for 31% of 2030 green jobs, but are concentrated in **lower-value, informal and care-adjacent roles**.

Climate finance & policy context

Africa faces disproportionate climate impacts despite contributing only **3–4% of global emissions**.

Finance received is only **3.3% of global flows**, meeting only 23% of estimated annual investment needs.

Climate finance is rarely directed toward **workforce development**, skills protection or social protection infrastructure.

Green jobs could help tackle social and economic challenges, as well as advancing the green transition

Africa's green transition is projected to generate between 3.8 and 7.9 million jobs by 2030, rising to 65.9–84.5 million by 2050.
The distance between the upper and lower bounds — 4.1 million jobs by 2030, 18.6 million by 2050 — is a measure of what policy action could achieve.

Four defining features will shape what happens:

1

The transition is a service-led story – this determines who can participate

Indirect jobs are projected at 56% of 2030 green employment, rising to 62% by 2050. Clean cooking will be the largest green value chain by 2030 — ahead of utility-scale solar — through networks of micro-distributors, maintenance technicians and community agents.

2

Workforce capability is just as constraining as capital availability, but receives less attention

Africa's renewable energy workforce is just 324,000 — 2% of the global total. That's despite holding 60% of the world's best solar resources. Where trained workers are absent, deployment stalls and the local employment opportunity is lost. Only 6.5% of African youth have completed a TVET programme.

3

Inclusivity will be determined by systemic reforms, not by participation targets alone

86% of projected 2030 green jobs are informal, and the value chains generating the largest employment volumes — clean cooking, waste recycling, solar home systems and e-mobility — are also the most accessible to women, youth and low-income workers.

But outcomes will not happen automatically and participation does not equal inclusion. Policies for formal wage workers will reach at most 14% of the 2030 green workforce without corrective measures.

4

Africa does not have a single green transition – strategy must be tailored

Nigeria's projected green workforce is 87% informal. South Africa's green transition is 70% formal and regulated procurement dominates. Kenya has sectoral diversity and mature digital infrastructure.

An approach that embraces this heterogeneity is most likely to unlock the full scale of potential.

Kenya inclusion metrics were not available throughout this study hence this country analysis is limited. The Kenya Integrated Household Budget Survey (KIHBS) microdata was inaccessible.

This study extends the *Forecasting Green Jobs in Africa* (2024) evidence base

It shifts analysis from the scale of the green employment opportunity to understanding depth, granularity and who can access it.

Four expansions in scope

Indirect employment is now modelled alongside direct job counts — capturing supply chain and livelihood effects excluded from the prior study.

Clean cooking is now introduced as a fully disaggregated 13th value chain.

Long-term projections to 2050 are introduced under technology and climate risk uncertainties.

Employment is disaggregated by formality, gender, enterprise size, and income level in Kenya, Nigeria, and South Africa.

Three focus countries

representing 27.6% of Africa's economic output

South Africa 

Shaped by a formal, utility-scale energy sector and the most capitalised just transition plan on the continent

Nigeria 

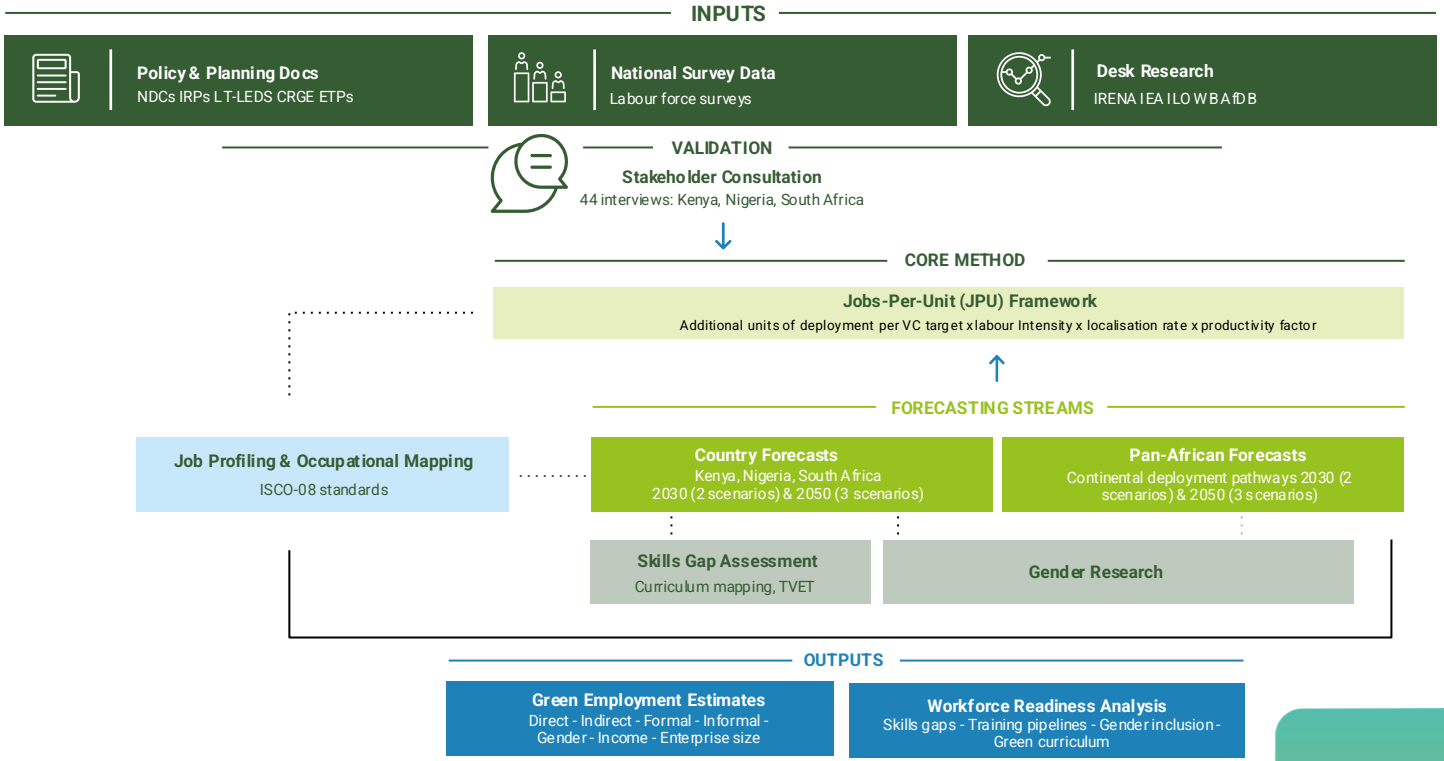
Vast informal economy and a comprehensive energy transition plan built around decentralised renewables and clean cooking

Kenya 

Strong renewables base, an emerging e-mobility sector and an ambition to lead East Africa's green industrialisation

The three countries profiled are not intended to represent Africa as a whole. Each was selected for its distinct characteristics, illustrating that no single solution exists for green jobs across the continent.

A demand-driven jobs-per-unit framework converts physical deployment targets into employment estimates

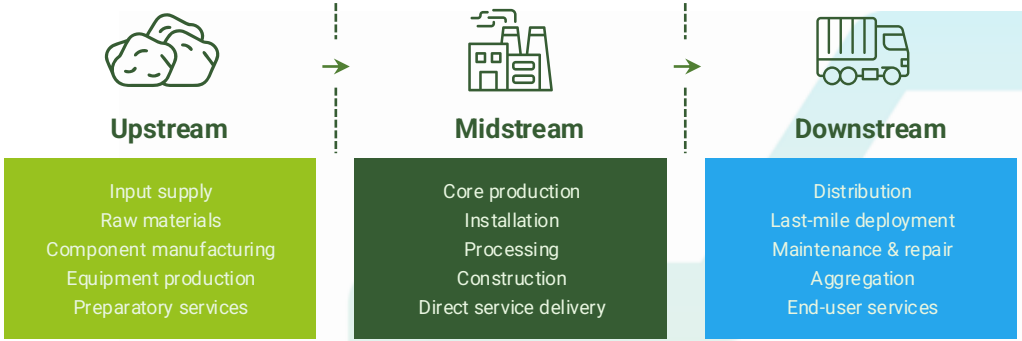


Value-chain-based definition of green jobs

A *green job*, for the purposes of this study, is any job generated within green growth sectors (and value chains thereof) that contributes to the production, deployment, operation, maintenance, financing or enabling of environmentally sustainable goods or services.

Green jobs in this study are not defined solely by environmental contribution, but also by their potential to constitute decent work. This includes employment that provides fair income opportunities and a pathway to stability or enterprise growth. Given the structure of African labour markets, this encompasses both **formal** employment (registered firms with contracts and protections) and **informal** work or self-employment, including **nano- and micro-enterprise** activity.

The research applies a three-stage value chain lens:



Within this structure, employment is distinguished by economic positioning:

Direct green jobs

Employment in the core activity of the value chain — midstream production, installation and service delivery.

Indirect green jobs

Employment in the immediate backward and forward linkages — upstream and downstream activities supporting the same value chains.

Scope boundary: Indirect employment excludes jobs outside these value chains. Induced, economy-wide effects from input–output linkages or broader macroeconomic spillovers are not included.

Sectoral scope

The study covers 13 value chains across 4 green growth sectors

Energy & power

- Wind
- Solar
- Geothermal
- Hydroelectric power
- Battery storage
- Power transmission & distribution
- Clean cooking

Mobility & transport

- Electric 2/3 wheelers
- Charging infrastructure

Agriculture & nature

- Climate-smart agri-tech
- Aquaculture & poultry
- Ecosystem conservation & nature-based solutions

Waste remediation & recycling

- Waste remediation & recycling

Africa's green employment opportunity is significant and already emerging

It is expected to generate 3.8–7.9M jobs by 2030, increasing to 65.9–84.5M by 2050.

Projected green jobs across Africa

2030 upper bound → **2050** high scenario

7.9M → **84.5M**

***10X** expansion across two decades*

Projected sub-regional distribution 2050

East and Southern Africa

49M

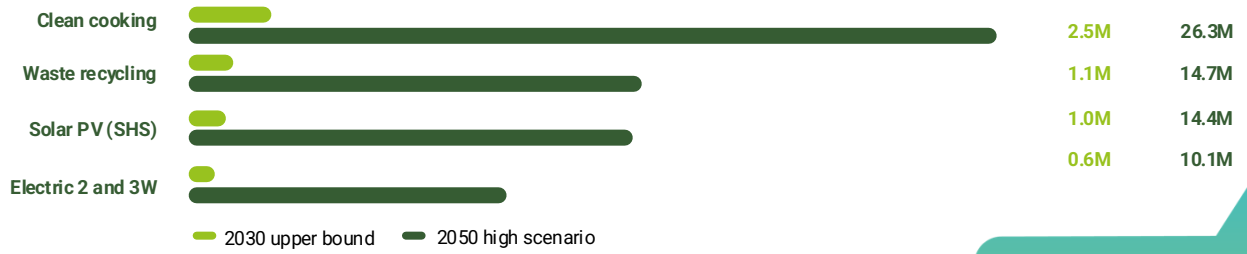
58% of total projected green jobs across Africa are concentrated in this region

55–57%

of projected 2030 green jobs are expected to be **indirect** (distribution, operations, maintenance, services), rising to **62% by 2050**

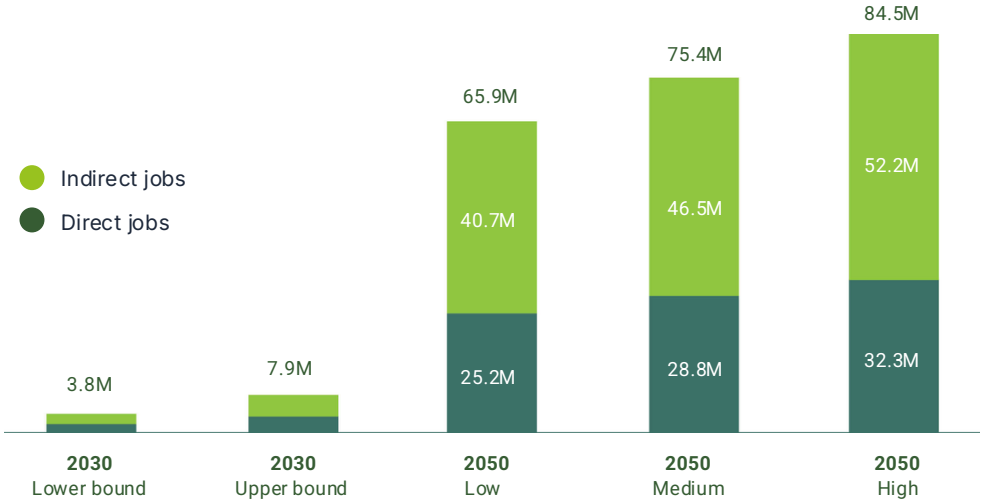
Top value chains by projected employment

Expected 2030 sectoral split: Energy & power (65%), waste recycling (16%), agriculture & nature (11%), mobility & transport (8%)



Three factors could generate an additional 4.1M green jobs by 2030

The gap between lower and upper bounds in 2030 depends on how quickly policy and financial frameworks translate demand into deployment.



Established demand: Demographic growth and urban centres sustain demand for energy access, mobility and waste services.

Service-led delivery: Indirect roles (56% of 2030 jobs) include local retail agents for clean cooking, solar home system (SHS) service providers, and informal waste networks.

WHAT WILL DRIVE GREEN JOBS DEMAND BY 2030?

Clean cooking investment

$675M in 2023 represents <35% of the $2B per year needed.

E-mobility regulation

13 country strategies published but implementation lags. Ethiopia and Rwanda lead in enforcement.

Circular economy regulation

Extended Producer Responsibility (EPR) regimes in South Africa and Kenya, Nigeria's 2025 plastic ban, and African Union Plan (July 2025) establish the legal demand floor.

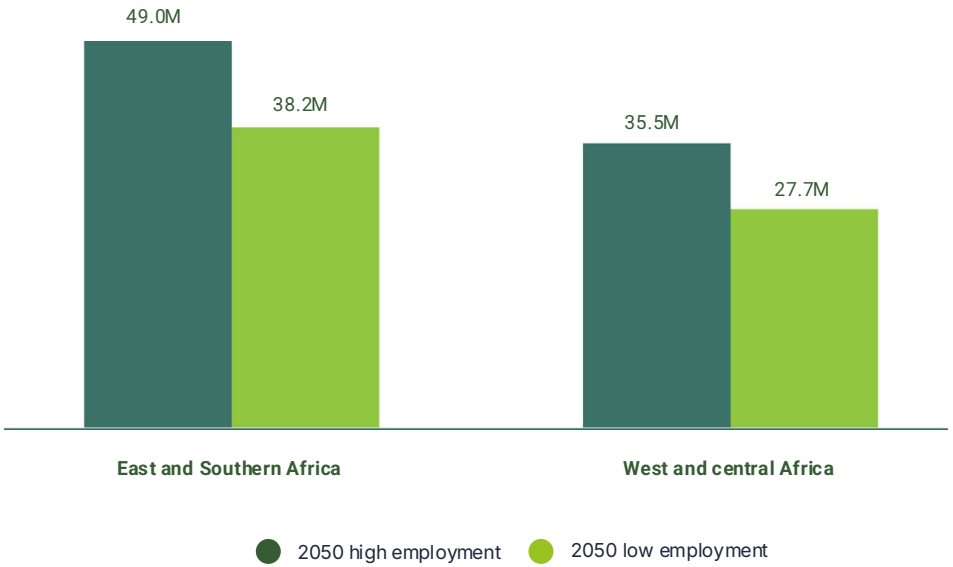
East & Southern Africa will generate the majority of 2050 green employment

58%

East & Southern Africa's share of 2050 high-scenario employment

40%

The region's share of sub-Saharan Africa's population



East & Southern Africa: 10.8M gap between high (49M) and low (38.2) scenarios.

West & Central Africa: 7.8M gap between high (35.5M) and low (27.7M) scenarios.

Disproportionate East/South share reflects over a decade of investment in procurement, digital finance and market development.

West & Central Africa's share is differently structured: large unmet demand in clean cooking and waste via informal channels.

80% of SSA's current EV fleet concentrated in Ethiopia, Kenya, Rwanda, Uganda and Tanzania.

Two regional pathways: East & Southern Africa and West & Central Africa

East & Southern Africa — 4 drivers

Policy execution

Kenya, Rwanda and South Africa are moving from NDC commitments to implementation with sector strategies and workforce planning.

Digital delivery leadership

Mobile money and PAYGO are embedded; East Africa's solar ecosystem is the most mature on the continent.

First-mover e-mobility

80% of sub-Saharan Africa's EV fleet is in Ethiopia, Kenya, Rwanda, Uganda and Tanzania — first-mover employment in assembly and maintenance.

Investment pipelines in expansion

Strong track record in project delivery and capital absorption attracts climate and private finance.

West & Central Africa — 4 characteristics

Scale of unmet demand

Largest access gaps in clean cooking, energy and urban services globally – drives high employment intensity in distribution and services.

Informality

Economic activity is organised through micro-enterprises and agent networks — there is a large, ready labour base for green job absorption.

Early-stage policy systems

NDCs and green strategies are in place – executing them will unlock investment and accelerate employment.

Emerging commercial ecosystems

E-mobility and waste activity are developing ahead of regulatory maturity — early ecosystems are poised to convert latent demand into employment at scale.

What must happen to achieve Africa's forecasted green employment by 2030

1

Enforce policies and targets, e.g. only 45% of African NDCs include clean cooking targets.

2

Direct climate finance to the high-potential value chains. Mitigation capital needs to reach clean cooking distribution, SHS networks and e-mobility assembly rather than utility-scale infrastructure.

3

Build domestic supply chain depth, especially in solar, battery and e-mobility. Africa captures almost none of the manufacturing employment in the technologies it deploys.

4

Keep grid infrastructure up to speed with deployment. Service-phase jobs only materialise where electricity systems support increased demand.

5

Deliver green skills for the high-potential value chains: clean cooking, solar, waste recycling and electric 2/3 wheelers.

6

Extend labour protections to platform and agent-based green workers. Only 6.5% of African youth have completed TVET; 86% of 2030 green jobs will be informal.

What must happen to achieve Africa's forecasted green employment by 2050

1

Sustain service-phase business models for clean cooking and SHS. Clean cooking employment is projected to grow >10x between 2030 and 2050.

2

Establish domestic manufacturing for solar, battery and e-mobility. Solar PV assembly could generate 140,000 jobs annually to 2050. AfCFTA-aligned industrial policy and investment is needed.

3

Build carbon market and MRV infrastructure to access private climate finance. Clean cooking, ecosystem conservation and waste recycling depend on results-based finance for commercial viability.

4

Invest in climate resilience to protect water-dependent value chains. This could reduce projected employment losses by up to 25% in the low scenario.

5

Enable small and informal enterprises to deliver green livelihoods at scale. Build access to finance, stable demand and fair earning opportunities now, and strengthen them over time.

6

Build skills for the value chains 2050 will need. Build capabilities in system operations, maintenance data monitoring and environmental compliance, to satisfy demand from service-driven models.

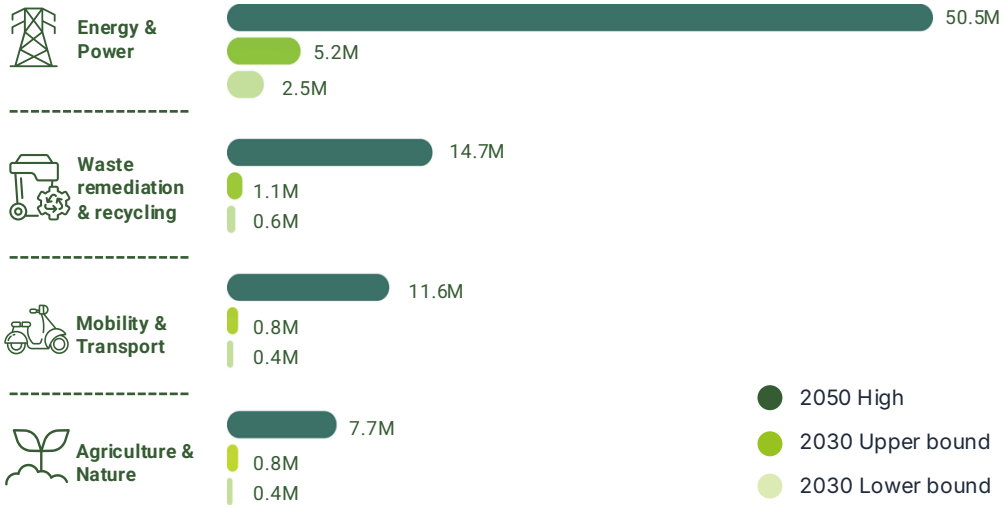
7

Shift climate finance to service-based value chains. Evolve from capital for infrastructure to models that support ongoing operations, asset replacement and revenue stability.

By sector: energy & power will drive the majority of 2030 green employment (65% of jobs)

Waste remediation & recycling, mobility & transport and agriculture & nature will emerge as anchors by 2050.

Sectoral projections



Insights by sector

Clean cooking and SHS are projected to account for 70% of 2030 lower-bound energy & power green employment — ahead of utility-scale solar.

Waste recycling: South Africa's EPR regime has already created over 24,000 formal jobs since 2022 and supported 47,000 waste pickers.

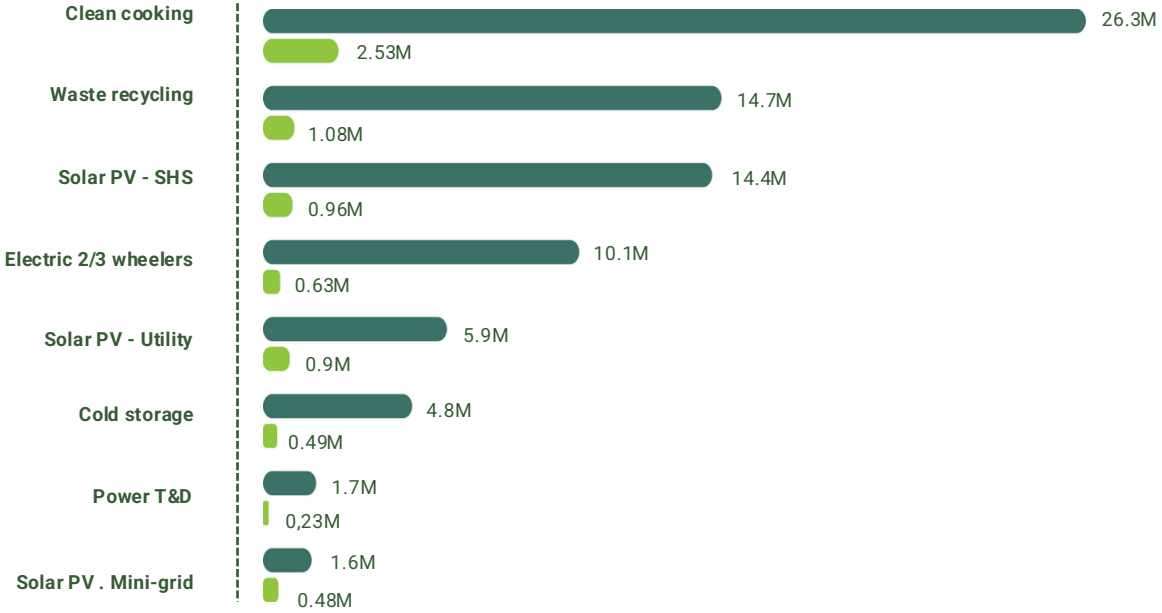
E-mobility is projected to generate 0.3–0.6M jobs by 2030 and up to 10.1M by 2050 as fleet electrification scales across okada/keke networks.

Agriculture & nature: Cold storage is the primary long-term growth driver.

By 2050, employment is projected to diversify — clean cooking alone grows from 2.5M to 26.3M

By value chain: those with large, unmet demand will drive employment

Value chain projections



26.3M
Clean cooking 2050 high
(vs 2.5M in 2030)

5.9M
Solar utility 2050 high
(vs 0.9M in 2030)

10×
Clean cooking growth 2030→2050
vs 7× for utility solar

Inclusion and informality: the transition will be driven by nano- and micro-enterprises

Expected informality rate

2030 LOWER BOUND
projected informal

2050 HIGH SCENARIO
projected informal

Accessible to women

2030 UPPER BOUND

31%

1.2M jobs

2050 HIGH SCENARIO

44%

36.8M jobs

Clean cooking and solar SHS will have the highest female participation and will be near gender parity by 2050.

Accessible to low-income workers

2030 UPPER BOUND

57%

2050 HIGH SCENARIO

52%

Value chains with highest proportion of jobs accessible: waste recycling (72%), clean cooking (68%), solar SHS (64%).

Nano- and micro-enterprise economy

Key roles: PAYGO solar agents, clean cooking micro-distributors and stove maintenance technicians, waste reclaimers and sorters, battery swapping station operators.

Dominance of nano- and micro-enterprise is a structural feature of Africa's distributed service economy — consistent across all three 2050 scenarios.

Policies designed for formal wage workers are expected to reach at most 14% of 2030 green workers. Without deliberate corrective measures, the green jobs transition risks reproducing existing inequalities.

Youth: quality gap in an access economy

90% of young employed Africans work in informal jobs with no social protection, no credential, no progression.

Green value chains are potentially accessible to youth with practical training achievable in weeks — but entry does not equal progression.

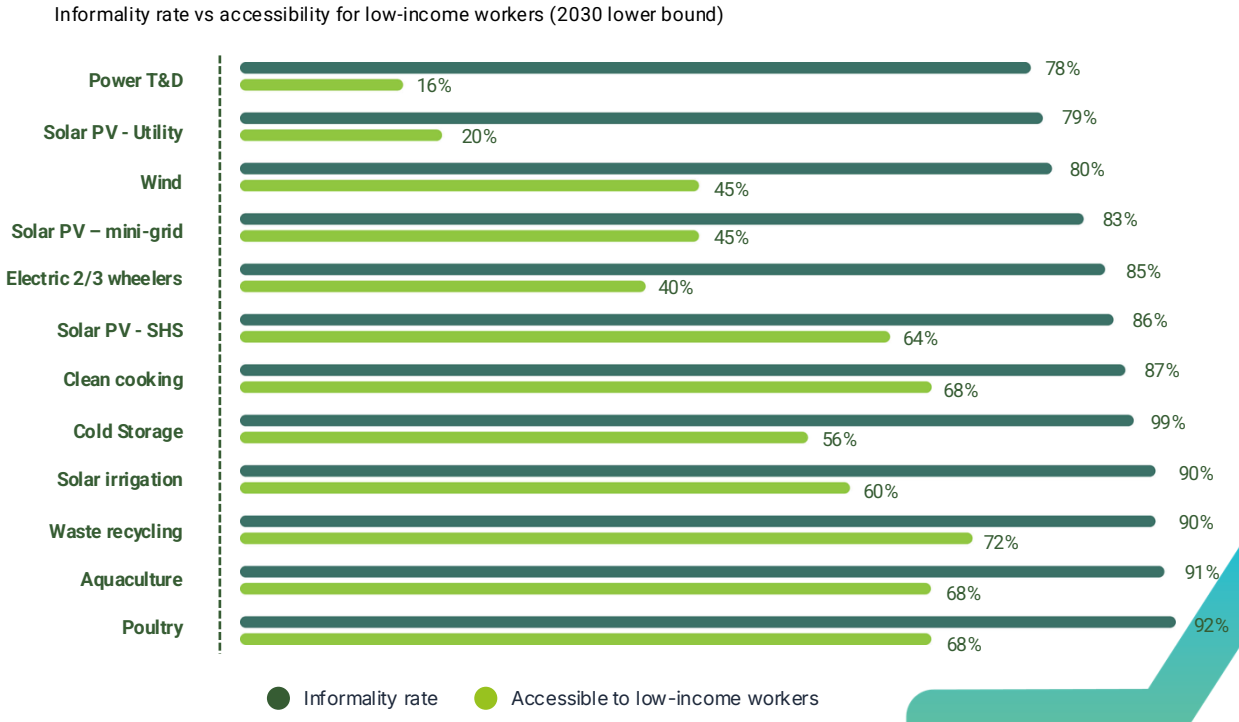
Kenya's e-mobility sector employs more than 11,000 people, with youth participation disproportionately high in informal maintenance and distribution.

Nigeria and Kenya's policy frameworks contain no concrete mechanism for linking existing informal youth operators to formal career pathways.

Women and low-income workers: value chains with the highest informality will be the most accessible

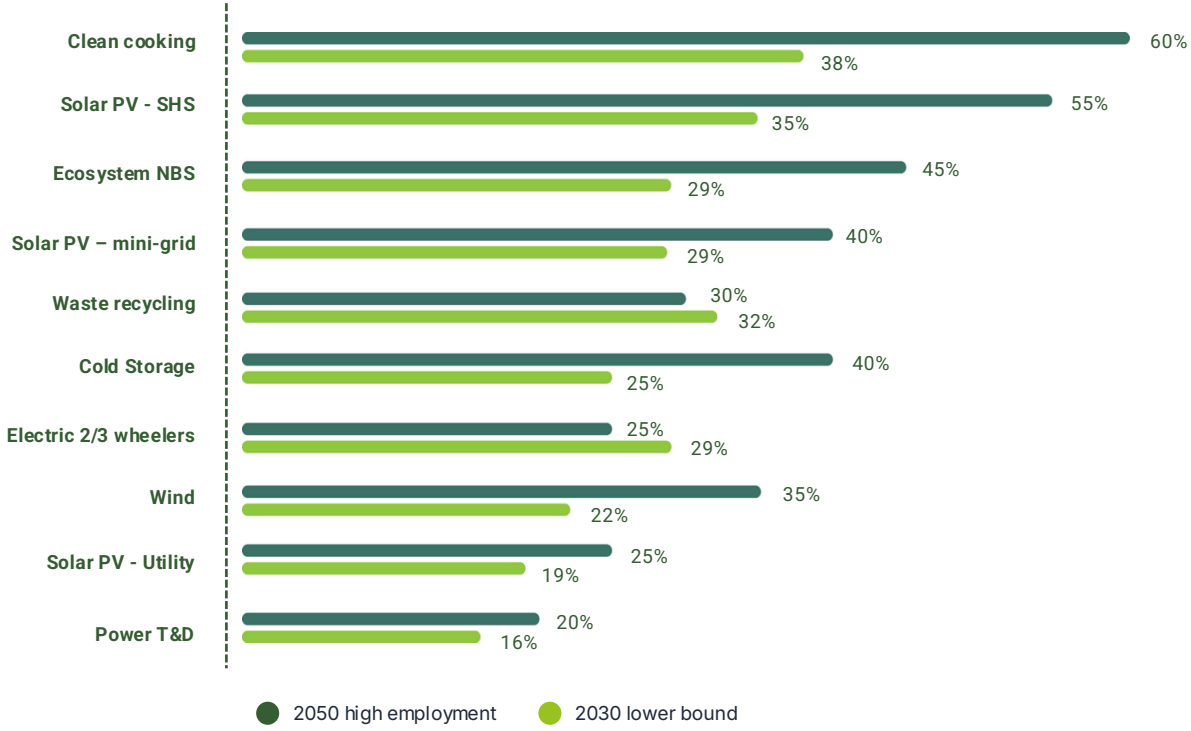
This means value chains generating the most employment are accessible to workers without formal qualifications, permanent employers or significant capital.

The positive correlation between informality and accessibility reflects the delivery architecture of service-intensive value chains, which reach lower-income, more geographically dispersed workers.



Women are projected to hold 31% of 2030 green jobs, rising to 44% by 2050

But female participation does not signal meaningful inclusion



Women are still concentrated in lower-value, informal roles while men dominate technical, field-based, and formal positions

The same **delivery models** that make it easier for women to enter also channel them into informal, commission-based roles with limited opportunities for advancement.

While training and placement programmes can improve women's earnings, they do little to address the **workplace barriers** that limit retention in higher-value roles.

Three barriers shape the gap between women's participation in green value chains and their access to higher-value roles

Safety and mobility. Female solar installers are often unable to take on remote or overnight assignments, not because they are excluded, but because basic conditions such as safe transport, appropriate accommodation and adequate facilities are missing.

Unpaid care responsibilities. place limits on women's availability for the long hours and site-based work typical of higher-tier green jobs. Activities such as evening maintenance, multi-day infrastructure work or shift-based operations often conflict with caregiving demands.

Gaps in certification and field placement. mean that many women who enter technical training do not transition into qualified roles. Female enrolment in engineering and technical fields across sub-Saharan Africa remains low.

Women's exclusion from green jobs stems from six domains of inequality

Cultural norms & gender stereotypes

Women are channelled into marketing or customer-facing roles; men dominate high-income technical, after-sales and franchising functions.

Gender roles & time use

Rigid schedules and site-based roles conflict with caregiving duties; micro-entrepreneurs must operate between domestic tasks.

Access to & control over assets

Gendered land and property norms block collateral for capital. Women lack 'tools of the trade' — driver's licences, smartphones, motorcycles.

Laws, policies & institutional practices

Informal, male-dominated recruitment networks; lack of maternity protection; gender-neutral frameworks that fail to correct market bias.

Patterns of power & decision-making

Underrepresentation in senior management and on investment boards (80–95% male in formal green energy) limits influence over HR and product design.

Personal safety & security

Harassment risks during travel to remote sites; lack of gender-sensitive worksite facilities force women to exit technical tracks.

These barriers intersect with geography (rural versus urban), income tier and educational level to produce differentiated exclusion patterns.

South Africa

South Africa's green economy is expected to generate 0.7–1.3M jobs by 2030, increasing to 4.3M by 2050. This realisation depends on addressing misalignments in income distribution, skills development, and sectoral concentration.

2030 upper bound → 2050 medium

1.3M → **4.3M**

Direct and indirect green jobs

55–57% of projected 2030 green jobs expected to be **indirect**

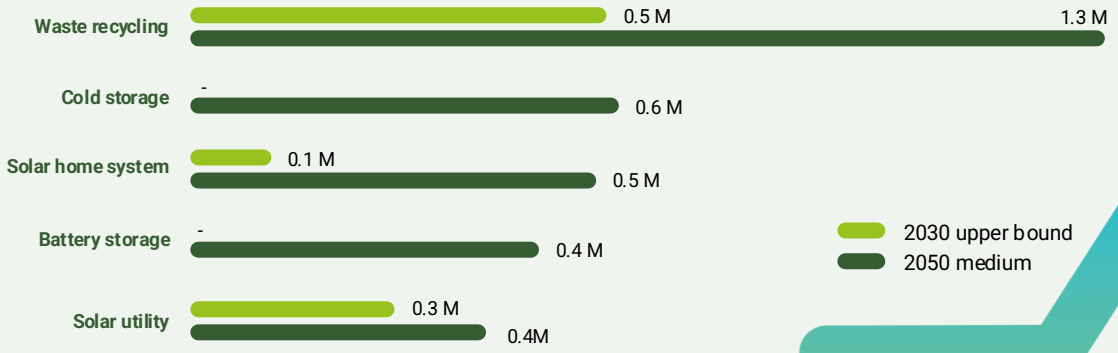
Concentration of projected 2030 green jobs in **energy & power + manufacturing & materials**

93%

Agriculture & nature emerges as third leading sector by 2050 (7%-16%), driven by projected 550K cold storage jobs

Expected 2030 sectoral split: Energy & power (~50%), manufacturing & materials (~47%), agriculture & nature (~3%)

Top value chains by projected employment



South Africa

Formal employment rate

70%	70%
2030 lower	2050 medium

Accessible to women

24%	24%
2030	2050

Below $5,500/yr

93%	88%
2030	2050

South Africa's highly formal economy masks five vulnerabilities

- **Most green workers earn below $5,000 per year**. This is because entry-level, labour-intensive roles dominate construction and waste collection.
- **A weakening education pipeline threatens the engineering talent base**. Declining pass rates in maths restrict the candidate pool for the projected technical roles, which means a risk of reliance on imported talent.
- **Projected green jobs for 2030 are concentrated in two sectors**. Energy and power and waste recycling account for almost all projected jobs for that year. Agriculture and nature is the main diversification opportunity – it could grow by up to 32x by 2050.
- **Female participation will stagnate at around 25% through to 2050**. This is due to segregation in male-dominated trades, and workplace barriers like inadequate facilities and transport risks.
- **The workforce will shift from temporary to permanent roles.** By 2050, construction-phase jobs will give way to operations and maintenance work in battery storage, smart grids and specialised recycling, meaning a more stable foundation for skills investment and household incomes.

Energy & power will anchor near-term employment – agriculture & nature will emerge by 2050

Energy & power

Large-scale renewable construction generates substantial but time-bound employment, ending when installation is complete. Grid modernisation provides permanent technical employment. By 2050, distributed systems are projected to overtake utility-scale solar as the dominant employment source.

Waste remediation & recycling

Extended Producer Responsibility (EPR) regulations (2020–21) transformed informal activity into a regulated industry. Labour intensity sustains growth: each additional tonne of waste generates proportional labour demand.

Agriculture & nature

Cold chain infrastructure is the primary long-run growth driver. Agricultural employment is the most climate-sensitive in the model — the largest proportional climate-driven decline risk across all sectors.

Formality: despite 70% formal green employment, most workers earn below $5,000 per year

Formality vs informality

- **Firm structure and procurement frameworks:** Energy employment is largely formal, anchored in regulated procurement and compliance frameworks. Waste recycling combines formal firms operating under EPR regulations with informal collection networks. Agriculture has lower formality due to smallholder and community-based systems.
- **The formal-informal split is projected to remain stable to 2050**, as long as employment remains anchored in procurement and compliance frameworks.
- **The structural drivers of informality** in waste collection, agriculture and last-mile distribution are unlikely to resolve without intervention.
- **To increase formality, segment-specific policy is needed**, including social protection for informal workers, portable credentials and formalised agent networks.

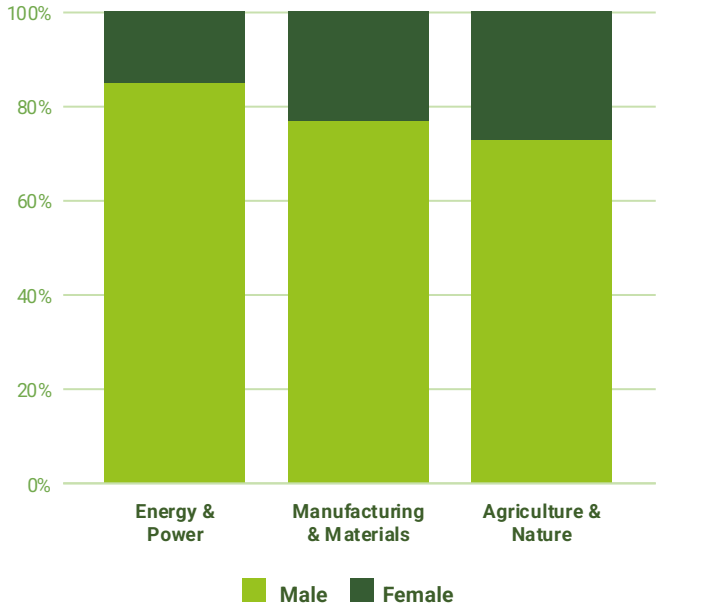
What drives the income bands

- **The construction-phase wage effect**: In 2030, the green economy will be dominated by construction, which creates high volumes of semi-skilled roles that are paid at or near minimum wage.
- **Sector composition compounds low-income concentration**: Waste recycling accounts for a large share of projected near-term jobs, concentrated in collection, sorting and aggregation. These roles pull the overall income distribution downward even as technical roles in the energy sector pay above minimum wage.

Green job creation does not automatically produce good jobs: Expansion of the green economy without quality interventions risks enlarging low-income employment rather than creating economic mobility. Job creation metrics need to be supplemented with earnings adequacy and career progression measures.

Gender: female participation is projected to stagnate at 25%

Female share by sector



Four drivers of gender stagnation

Occupational segregation: Waste remediation & recycling is a dominant sector and has core trades that are male-dominated.

Weak female TVET pipeline: Few women are enrolled for solar PV certification. Without intervention, the qualified talent pool remains structurally skewed.

Workplace conditions affect retention: Women face an absence of gender-appropriate facilities, GBV risks, rigid shift structures and limited progression pathways.

Agriculture & nature participation overstates inclusion: Female agricultural employment concentrates in lower-value, less secure roles — participation rates overstate genuine economic inclusion.

Stakeholders cautioned that **just transition reskilling programmes** often prioritise displaced fossil-fuel workers — predominantly men — thereby limiting women's access to green opportunities.

Gender: workplace adaptation is a low-cost way to improve retention of women

Basic infrastructure

Separate washrooms and changing facilities at remote or field-based worksites.

Clear contractual protections

Written maternity and leave provisions embedded in contracts, alongside structured grievance and reporting mechanisms.

Flexible arrangements

Adjusted duties for expectant workers, flexible reporting hours, structured mentorship and counselling, and safety-linked transport support.

Circular economy: formalise without displacing

Formalise the waste sector through structured partnerships between formal recyclers and waste-picking cooperatives.

Training structure

Specialised masterclasses on energy value-chain economics, delivered by industry associations.

Financing conditionality

Finance disbursements that are conditional on employers providing enabling infrastructure for women.

By 2030, green skills demand will be driven by solar PV, wind energy and waste recycling

Value chain	Green job profiles	Green skills required	Skills gaps / mismatches
Solar PV	Installers, O&M technicians, performance analysts, rooftop advisors, recycling technicians.	Install/maintain systems, monitor output, optimise generation, manage end-of-life recycling.	Heavy focus on installation. Lack of system monitoring, digital integration, lifecycle management and advisory training
Wind energy	Turbine O&M technicians, blade repair specialists, remote monitoring operators, HSE officers.	Operate/maintain turbines, inspect/repair blades, monitor remotely, apply HSE standards.	Severe shortage of domestic training for specialised maintenance, blade repair/recycling and remote diagnostics
Waste recycling	Sorters/processors, MRF operators, EPR coordinators, logistics supervisors.	Process recyclables, operate MRF equipment, ensure EPR compliance, manage logistics.	No nationally recognised certification for EPR compliance. MRF operator training is missing from mainstream TVET

⚠ **PARTIAL GAP** — Entry-level supply adequate; gaps in advanced / digital / lifecycle roles

✕ **STRUCTURAL GAP** — National training absent or far below deployment need

Key takeaway: Across all sectors, entry-level skills are broadly available, but there are gaps in advanced, cross-disciplinary and emerging roles that formal TVET systems have not yet designed programmes for.

Four existing models for green skills delivery in South Africa

1

Industry association-led solar certification

A national certification framework operating alongside the DHET-SETA system demonstrates how sector associations can shape qualification standards ahead of regulatory requirements.

2

Wind technician occupational standard-setting

A competency framework for wind technicians used by individual firms to structure internal training pipelines — a de facto occupational standard more current than the formal TVET curriculum.

3

Fossil fuel worker retraining (just transition model)

A retraining centre linked to a coal decommissioning site trains displaced workers into solar mounting and battery maintenance roles tied to local employer demand — the most effective design template identified.

4

Public research and academic co-creation

A national research entity and major university established live industry feedback loops for students, grounding academic green energy programmes in actual policy and industry needs.

Nigeria

Nigeria's transition is projected to scale from 1.2M jobs in 2030 to 10.5M by 2050, with a workforce characterised by extreme informality and nano-enterprise dominance. Realising this potential requires a strategy that improves job quality within existing informal systems, closes the gender gap and bridges the technical skills deficit.

2030 upper bound		2050 medium
2.4M	→	**10.5M**

Projected 4.4x growth from 2030 to 2050, accounting for both direct and indirect jobs.

55–57% of projected **2030** green jobs expected to be **indirect**, rising to **62% by 2050**.

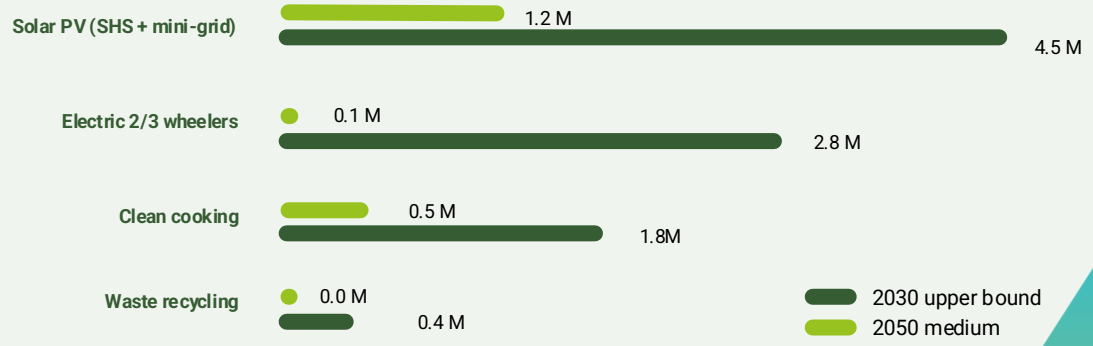
Concentration of projected 2030 green jobs in **energy & power**

91%

Mobility emerges as second leading sector by 2050 (2–27%), driven by okada/keke fleet electrification.

Expected 2030 sectoral split: Energy & power (91%), agriculture & nature (5%), mobility (2%), manufacturing (1%)

Top value chains by projected employment



Nigeria

Expected informality rate

87%	88%
2030 lower	2050 medium

Accessible to women

8.5%	7.5%
2030	2050

Earning less than $475/yr

60%	60%
2030	2050

Nigeria's green transition is defined by five structural realities

- **Around 87% of Nigeria's green workforce is informal**, and 73% operates through nano-enterprises. Improving the quality of these jobs matters more than increasing the level of formality.
- **Employment is concentrated in one sector**. Energy and power accounts for 91% of projected 2030 jobs, leaving the green economy vulnerable. Expanding mobility and transport, and agriculture and nature, will be vital.
- **A shortage of skilled workers is keeping wages high**. Around 60% of green workers earn above the annualised minimum wage, because technicians and engineers are in short supply. Wage floor protections may be needed as training is expanded.
- **The green workforce will still be over 90% male in 2050**. This is because of the dominance of the energy sector, which is currently over 93% male. Closing the gap will require workplace adaptations and deliberate expansion of sectors where women are better represented, like climate-smart agriculture.
- **The skills system is mismatched to market demand**. Nigeria has no national green skills registry, and TVET produces generalists rather than specialists. Bootcamps and firm-based internships could be viable solutions.

Energy & power is the dominant sector in Nigeria

Energy & power

Millions of households require SHS and mini-grid connections, which drives labour demand. Employment scales with customer numbers rather than installed capacity, meaning that the decentralised deployment model is itself a driver of high job volumes.

Agriculture & nature

Long-term growth is contingent on electrification reaching cold storage, irrigation and agro-processing — not just household connections. Agriculture & nature is projected to grow 4× by 2050.

Mobility & transport

Growth will be driven by the electrification of Nigeria's two- and three-wheeler fleet. Near-term growth is likely constrained by grid and charging infrastructure sequencing. The sector is projected to grow 62× from 2030 to 2050 (medium scenario).

The gap between conservative and favourable employment scenarios is driven by three factors:

Technology choices: The decision between manual, decentralised systems and automated, utility-scale solutions determines how many workers are needed per unit of energy or service delivered.

Policy implementation: The pace and quality of delivery on the Energy Transition Plan, mini-grid reform and e-mobility regulation will determine how much of the potential is realised.

Climate risk: Flooding, heat stress and land degradation introduce variability across sectors by affecting productivity, infrastructure viability and operational continuity in ways that are difficult to predict but could affect employment outcomes.

Formality: Nigeria's high projected informality is a feature of decentralised delivery

Formality pattern

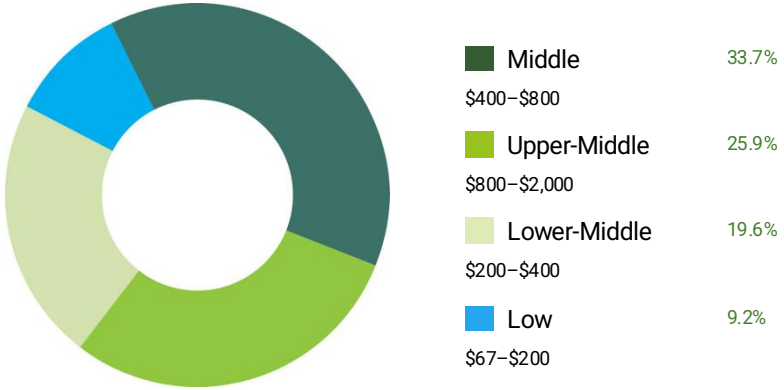
87% informal — driven by SHS, mini-grids and clean cooking delivered through agents, micro-franchises and self-employed workers.

Informality is highest in energy & power (87.7% informal) where nano-enterprise SHS installers dominate, and lowest in agriculture & nature (82.2% informal).

Effective policy must work within informal systems — mandating formalisation is unlikely to be effective at the scale and speed the sector requires.

Most viable interventions: extend social protection to informal workers, introduce portable credentials, establish quality standards within informal frameworks.

Income bands (USD)



Technical scarcity drives the above-average wage profile

Demand for specialised engineers, certified solar installers and battery technicians outpaces supply. Growing the supply of green workers will reduce scarcity and moderate average wages. Policymakers should anticipate this compression and design appropriate measures, including minimum wage enforcement, social protection floors and career progression pathways.

Gender: even by 2050, Nigeria's green workforce is projected to be over 91% male

Understanding the gender gap

Nigeria's gender gap is driven by the dominance of a heavily male energy & power sector.

Clean cooking illustrates how formal system boundaries understate female participation: our analysis focuses on LPG distribution (male-dominated). Women have higher participation in cookstove production, last-mile distribution and food processing, but these are harder to quantify.

Two complementary strategies are needed:

1. Increase women's participation within the energy sector through deliberate recruitment and workplace adaptation.
2. Expand the share of employment in agriculture and other sectors where women are better represented.

Three structural barriers for women

Stakeholder consultations identified women-led enterprises as concentrated in low-value segments of green value chains, a pattern that is reinforced by the financing landscape. Women in Nigeria's green economy face compounding structural barriers:

1. **Childcare not provided for in training programmes**
   Programmes without childcare provisions effectively exclude a substantial share of the potential female green workforce.
2. **Male-dominated technical networks**
   Women in clean cooking, SHS and e-mobility sales operate at the margins of male-dominated technical networks — limiting informal knowledge transfer, peer learning and mentorship.
3. **Mobility constraints in field-based roles**
   Safety risks, absence of transport support and social norms create structural barriers that reduce access to the highest-volume green employment categories.

Gender: to scale women-led green enterprises, four elements are needed

1

Catalytic finance unlocks entry

Alternative credit-scoring systems, village loans and savings associations, and demand-aggregation mechanisms expand access where collateral-based lending excludes women. Philanthropic 'risk capital' helps absorb early-stage risk and pilot productive-use financing models that commercial lenders are unwilling to support.

2

Productive infrastructure converts capital into value creation

Shared production hubs equipped with industrial-grade machinery enable women to shift into higher-value processing and technical services without prohibitive upfront investment. When paired with locally delivered training and multi-year funding cycles, these investments translate technical skills into viable enterprises.

3

Market guarantees reduce uncertainty and enable expansion

Phased compliance windows prevent upfront exclusion, while EPR frameworks and procurement quotas create predictable demand. Guaranteed market access improves investment viability and reduces the risk profile for small and early-stage firms.

4

Relational support stabilises growth

Solidarity cohorts, entrepreneur-led mentorship and on-the-job training models reduce isolation and confidence barriers. When combined with market-led growth strategies that prioritise revenue generation over grant dependence, these practices support movement from subsistence activity to scalable green economy participation.

Four structural conditions shape the green skills landscape in Nigeria

1

Training system is misaligned with green labour market

Public TVET teaches wiring/installation but the market requires AI-based fault detection, IoT monitoring and battery management firmware governance.

2

Private firms are the de facto training system

Most of Nigeria's green workforce is trained outside the formal system. A 'triple helix' approach (government providing policy context, industry providing applied training, and institutions providing theory) is identified by education stakeholders as the most effective alignment mechanism.

3

No data infrastructure to track the gap

There is no national registry and no consolidated enrolment data for green-relevant qualifications. This means the gap is likely understated precisely because the system to measure it does not exist.

4

Geographic contraints

Northern Nigeria has the greatest energy access deficit and the largest potential for distributed energy employment, yet also the lowest digital literacy in the country. Flexible, community-level delivery models are likely to be more effective than fixed institution-based provision.

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By 2030, green skills will be driven by distributed solar PV, e-mobility and clean cooking

Value chain	Green job profiles	Green skills required	Skills gaps / mismatches
Solar PV *(Utility-scale & distributed)*	IoT remote operations technicians, AI fault detection specialists.	Monitor performance via IoT platforms, remotely identify faults; apply AI-based diagnostics for predictive maintenance.	IoT and AI-based systems are absent from TVET curricula. Solar e-waste & battery recycling skills do not exist in-country.
E-mobility *(Electric 2 & 3 wheelers)*	EV diagnostics & motor repair mechanics, battery pack assemblers (BMS focus).	Diagnose/repair EV motor controllers and BMS firmware, manage battery end-of-life logistics and processing.	No national EV technician standard exists, excluding informal mechanics. High risk for petrol-dependent mechanics with no transition pathway.
Clean cooking *Decentralised models*	Carbon & climate finance MRV technicians, PAYGO consumer finance officers, digital extension & awareness agents.	Document fuel savings and emissions for MRV results-based finance, manage PAYGO platforms and digital customer defaults.	Carbon MRV and climate finance skills are absent from TVET. Consumer extension agents lack country evidence in the training system, blocking access to carbon markets.

Key takeaway: The challenge is not curriculum content alone but scale. The most relevant national green skills programme operates at hundreds of graduates per year against a projected workforce of tens of thousands. Skills provision remains concentrated in installation and basic technical roles, while employment growth accelerates in higher-value IoT operations, BMS governance, and carbon MRV.

Four existing models for green skills delivery in Nigeria

Nigeria's most effective outcomes are based on training for a defined role with a guaranteed income or employment pipeline.

Demand-linked pipeline

Example: REA NextGen Renewable Energy Service Company

Structured bootcamp training combined with nine-month paid internships — illustrates demand-linked training in the energy access sector. The most effective model identified for quality and deployment capacity.

Coordinated industry + government investment

Example: Climate Action for Women / Youth in Power Foundation

Targeting 14,000 electric vehicle technician trainees by the end of 2026, this partnership demonstrates that where industry investment and government support align around clear employment targets, workforce scale-up is achievable in short timeframes.

DFI-funded climate training

Example: Federal Ministry of Environment / World Bank IDEAS Project

Six-month intensive training in solar irrigation and climate-smart agriculture — a replicable model for structuring development finance support in value chains that are both climate critical and labour intensive.

‘Triple helix’ curriculum alignment

Example: ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE)

Regional certification framework aligned with international accreditation standards. Government provides policy context, industry provides applied training, and academic institutions provide theoretical grounding — curriculum stays closer to market demand without constant reform cycles.

Kenya

Kenya's green transition is distinguished by its sectoral diversity and relatively mature digital infrastructure. The main challenge is coordinating workforce development across a decentralised governance system.

2030 upper bound		2050 medium
364k	→	**2.6M**

7.1x growth trajectory from 2030 to 2050

55–57% of projected 2030 green jobs are expected to be **indirect**

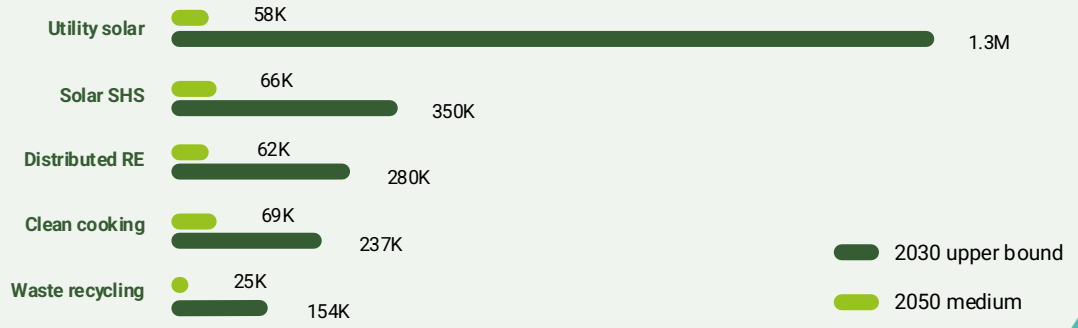
Concentration of projected jobs in **energy & power** **70%**

comprising four value chains: SHS (18%), clean cooking (19%), distributed RE (17%), utility solar (16%).

Utility solar is expected to grow 30x from 58k jobs in 2030 to 1.3M by 2050

Expected 2030 sectoral split: Energy & power (70%), agriculture & nature (14%), manufacturing & materials (10%), mobility & transport (6%)

Top value chains by projected employment



Kenya inclusion metrics were not available for this study hence this country analysis is limited. The Kenya Integrated Household Budget Survey (KIHBS) microdata was inaccessible.

Kenya must overcome five main challenges

- **Kenya's 2030 green jobs are spread across sectors, but utility solar will dominate by 2050**. In 2030, jobs will be split across SHS (18%), clean cooking (19%), distributed renewable energy (17%) and utility solar (16%). But utility solar is projected to grow 30x between 2030 and 2050.

- **The county-based system hampers workforce planning**. Employment is growing at county level but training systems are still centralised or fragmented. Green skills need to be implemented into County Integrated Development Plans.

- **The market is shifting from foundational to advanced technical skills**. Manual installation skills are common, but demand is moving to solar analytics, remote monitoring and EV bus assembly. Currently, specialists are often imported.

- **Kenya has carbon market potential, but this is undermined by a lack of verification capability**. Without local experts to verify carbon credits, Kenya relies on expensive international consultants, meaning the financial benefit goes elsewhere.

- **Unpaid placements and lack of childcare are excluding youth and women**. Unpaid industrial work placements ('attachments') and the absence of childcare at TVET institutions harm inclusion. Paid attachments and on-site childcare have been shown to improve retention, particularly for women in technical trades.

Four structural conditions shape the green skills landscape in Kenya

some of which are shared by South Africa and Nigeria

1

Curriculum is outdated and misaligned with market demand

Public TVETs teach manual installation but employers require AI-driven solar analytics, IoT remote monitoring, BESS operations and carbon MRV. Only 3–4% of TVET trainers have adequate green skills exposure.

2

Private firms are the de facto training system

The KenGen Geothermal Training Centre demonstrates that employer-anchored institutions can serve broader skills markets beyond a single company's needs. Formalising this learning requires Kenya's qualification authorities to extend RPL pathways to green occupations, using verifiable firm records.

3

Governance is devolved and green skills data is absent

Green skills are not integrated into county planning frameworks. This creates a coordination gap between national TVET reform agendas and local deployment realities, particularly for climate-smart agriculture, ecosystem conservation and distributed energy.

4

No consolidated qualification data

There is no enrolment or graduation data for green-relevant qualifications. This means the supply–demand gap is likely understated, particularly for informal green employment in agriculture & nature and waste remediation & recyling.

By 2030, green skills will be driven by geothermal, e-mobility and solar PV

Value chain	Green job profiles	Green skills required	Skills gaps / mismatches
Geothermal *(Upstream, O&M & compliance)*	Geothermal resource engineers, drilling-rig operators, well logging technicians.	Characterising/monitoring subsurface resources, managing well integrity and reservoir pressure.	Reservoir engineering and drilling-rig skills do not exist in-country. KenGen training functions as an employer-anchored institution, limiting system-wide replication.
E-mobility *(Electric motorcycles & infrastructure)*	EV maintenance & diagnostics technicians, EV bus assembly fabricators.	Diagnosing/repairing motor controllers and BMS units, advanced specialised welding (MIG/TIG) for assembly.	EV component fabrication and specialised welding labour are imported. Advanced battery diagnostics and BMS firmware skills are absent from mainstream TVET.
Solar PV *(Utility-scale & distributed)*	AI-driven solar analytics specialists, IoT remote monitoring technicians.	Applying AI-driven analytics and IoT tools for performance optimisation, managing productive use (irrigation, cold chain).	AI analytics and IoT monitoring are absent from mainstream TVET curricula. Provision is concentrated at the installation end; optimisation and diagnostics are underserved.

Key takeaway: Foundational skills are broadly available across value chains — the gaps are in specialised and emerging roles either absent from mainstream curricula or produced at volumes far below deployment need.

Four existing models for green skills delivery in Nigeria

Training for a defined role with a guaranteed income or employment pipeline is most effective, as in Nigeria and South Africa.

Paid opportunities increase retention

Example: Paid attachments (GIZ dual training model)

Paid industry attachments produce stronger retention and skills quality than unpaid models. Industry stakeholders confirm paid attachments are the most effective intervention in Kenya's green skills system.

Employer-anchored training

Example: KenGen Geothermal Training Centre

Where employers anchor training institutions collectively rather than independently, training capacity can serve a skills market beyond a single company's needs. This model is directly applicable to the solar, BESS and e-mobility sectors.

National qualification alignment

Kenya's comparative advantage is firm-based training that is recognised within a national qualification structure. Private bus and motorcycle operators have established technician training programmes linked to fleet maintenance needs and recognised within national frameworks.

Embedding sustainability into existing curricula

Integrating green skills modules into existing curricula scales green skills provision without requiring new qualifications or institutions — the most cost-efficient route to broadening the green skills base.

Childcare at TVET institutions: Local governments that funded childcare centres demonstrated measurable improvement in female participation and completion rates — Kenya-specific evidence that works but has not been scaled into standard TVET programme design.

Ten priority actions to unlock Africa's green employment potential

	High urgency	Moderate urgency
High feasibility	**QUICK WINS** 1 Direct finance to service-led value chains. 2 Embed workforce development and inclusion in green financing. 3 Link finance to employment quality.	**FOUNDATIONAL STEPS** 4 Close the labour market data gap.
Moderate feasibility	**STRATEGIC IMPERATIVES** 5 Invest in market-making for underserved segments. 6 Formalise on-the-job training via RPL. 7 Reform TVET with modular, short-cycle programmes. 8 Extend social protection to informal workers.	**SYSTEMIC SHIFTS** 9 Establish national green jobs policy frameworks. 10 Remove regulatory bottlenecks.

Ten priority actions to unlock Africa's green employment potential

1

Direct public and development finance towards service-led value chains

Overemphasis on utility-scale energy infrastructure, which generates most of its employment in the construction phase and captures a lower share of women and informal workers, risks concentrating green finance in the segments with the lowest long-run employment intensity. Service-led value chains generate more employment per dollar invested and reach a wider range of workers.

2

Embed workforce development and inclusion criteria into green infrastructure financing

Earmarking a defined share of deployment financing for workforce training ensures skills supply aligns with asset deployment. Deals should include gender inclusion criteria, such as minimum women's participation ratios in construction and operations phases, gender-responsive worksite infrastructure and safe transport.

3

Link green finance to employment quality and inclusion

'Jobs created', the standard metric used in development finance, is inadequate for capturing the quality of employment. Financing instruments should be conditioned on indicators that capture wage levels relative to statutory thresholds, social protection coverage, contract duration and the proportion of workers drawn from historically excluded groups.

4

Close the labour market data gap

Green occupation modules, disaggregated by gender, employment type and value chain, must be integrated into labour force surveys; survey data should be linked to national qualifications registries and social protection enrolment records to track the formalisation of green workers; and these systems should be designed for continental interoperability. Industry associations must publish annual sector workforce plans.

5

Invest in market-making infrastructure for underserved segments

Business development services and digital financial literacy support tailored to women-owned clean cooking and SHS enterprises, simplified formalisation pathways for informal e-mobility mechanics and waste recyclers, and youth-targeted apprenticeship programmes with guaranteed income during the training period are all areas where companies and sector associations could invest alongside public and development finance partners.

Ten priority actions to unlock Africa's green employment potential

6

Formalise on-the-job training and apprenticeships to recognise informal workers' existing skills and prior experience

Co-credentialling frameworks that allow firms' internal training programmes to contribute towards national occupational certificates could be developed by training institutions and qualifications authorities working jointly with industry associations. Expanding RPL enables uncertified workers to gain portable credentials, improving their mobility, access to better-paying roles and integration into formal financial services.

7

Reform TVET delivery through modular, short-cycle programmes that integrate digital and green competencies

Because fixed-site institutions struggle to reach underserved communities and workers cannot afford long classroom absences, training must become modular and competency-based, delivered through mobile training units and on employer premises. Embedding green skills modules into existing programmes would be more resource-efficient than launching standalone green credentials.

8

Extend social protection and minimum earnings floors to informal and nano-enterprise workers through mobile-based platforms

Social protection instruments, including health insurance, accident coverage and contributory pension schemes, could be extended to self-employed green workers as a condition of market authorisation for the platforms and companies that engage them– using existing digital payment platforms and mobile money architectures.

9

Establish dedicated national green jobs policy frameworks and embed employment outcomes into sector-specific strategies

Governments across Africa need to develop standalone national green jobs strategies that define employment targets by sector and value chain, assign institutional ownership to labour and energy ministries jointly, and establish coordination mechanisms between climate, finance and employment portfolios.

10

Remove regulatory bottlenecks

Administrative friction in mini-grid licensing, solar hardware importation and fuel pricing penalises clean alternatives and suppresses employment-generating investment. Labour economics research on infrastructure-led job creation shows that employment multipliers per megawatt installed are highest when projects proceed in predictable sequences, because this allows local labour markets and supply chains to develop absorptive capacity.

ANNEX

Green job profiles are built through a four-stage pipeline

Stage 1 · Job profiling

Map value chain activities against country-specific policy frameworks; classify roles by VC stage & economic positioning

- **Sector studies** — Published workforce data
- **Occupational databases** — Green skills assessments
- **Comparable countries** — Cross-country benchmarks

Roles classified by value chain stage & economic positioning

Stage 2 · Competency assessment

Required competencies assessed at task level and mapped against observable training supply

- **Task-level skill requirements** — Competencies defined at the task level for each role
- **Training supply mapping** — Observable provision in each country mapped against demand

Green jobs identified & classified using national labour force survey data

Stage 3 · ISCO-08 classification

Country coding systems harmonised to ISCO-08; unit groups matched to predefined value chain mapping

- **Country LFS data** — National coding systems
- → **Harmonise to ISCO-08** — Common occupation framework
- → **Value chain mapping** — Qualify green occupations per stage

Confirm alignment to green economic activity; reduce false positives

Stage 4 · Tiered validation

- **Industry descriptors**
- **Activity descriptors**
- **False positive filter**

Verified green job profiles

Disaggregated by formality · gender · income level · enterprise size

Key scope boundaries

- All employment figures represent gross headcount demand at a point in time (2030 or 2050) rather than cumulative job additions or net employment effects (accounting for displacement) across the broader economy.
- Job losses in fossil fuel or conventional sectors are not modelled, and net employment effects, while expected to be positive, are outside the scope of this analysis.
- The projections also do not capture the greening of existing workers transitioning into equivalent green activities without changing occupation, meaning the figures are likely conservative with respect to the full workforce transformation underway.
- Indirect employment in the model is measured within each value chain rather than through input–output multipliers capturing spillover employment across the economy, due to the absence of consistent country-specific input–output tables for the green value chains modelled here. Indirect job figures are therefore conservative relative to economy-wide indirect effects.
- Nano and micro-enterprise livelihoods are included as a sub-category within indirect employment. This reflects a deliberate modelling choice. Their activities sit upstream and/or downstream of the core installation and operations roles that define direct employment, and their structural characteristics, including informal contracting, commission-based income and low capital intensity, place them outside the direct employment categories applied in this model. This classification is consistent with labour force survey architecture (which has been used for three target countries in this study), which records own-account workers separately from employees.

Key scope boundaries

- On data quality, national labour force surveys, while the best available source for informal employment estimates, may undercount workers in unregistered enterprises, particularly in agriculture & nature and waste remediation & recycling.
- The tiered ISCO-08 validation procedure and the use of primary stakeholder interviews across all three countries were applied precisely to reduce the risk of misclassification compounding through the model.
- The scenario structure presenting upper and lower bounds rather than point estimates is designed to reflect remaining uncertainty transparently rather than obscure it behind a single figure.
- It is also worth noting that job quality dimensions, including wages, income stability and access to social protection, are not modelled directly.
- The income band disaggregation provides a partial signal, but a dedicated job quality analysis remains an important area for follow-on research.
- As noted earlier, the sectoral scope is weighted towards mitigation-oriented value chains; adaptation-relevant employment falls largely outside the model, and the figures should therefore be read as a considered lower bound on the full green and climate-compatible jobs opportunity rather than a comprehensive account of Africa's broader green economy workforce.

Key scope boundaries

- Value chains are modelled as maintaining a fixed structure up to 2050 (as the internal composition of activities does not shift in response to learning curves, localisation dynamics or gains of productivity according to the formulas).
- The baseline year is 2023, reflecting the most recent year for which consistent data was available across all modelled value chains and to maintain comparability with the previous *Forecasting Green Jobs* study.
- Productive use of energy is treated as an indirect employment multiplier within each relevant value chain rather than as a separate category, and its full contribution is therefore distributed across sectors rather than consolidated in a single line. A clean cooking connection that enables food processing or catering is counted in the energy & power value chain, while a solar irrigation connection that enables agro-processing is captured in agriculture & nature.