
# CEPREC

Empowering Africa's energy transition through knowledge and skill development

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CHATHAM HOUSE

Tshwane University of Technology
*We empower people*

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IN DEED AND IN TRUTH

CIRCULAR ECONOMY POWERED RENEWABLE ENERGY CENTRE
CEPREC

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Kigali Collaborative Research Centre

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UK Research and Innovation

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AYRTON FUND

CEPREC


From Westminster to Windhoek—building bridges for a sustainable energy future.

# About us

The Circular Economy Powered Renewable Energy Centre (CEPREC) is a Pan-African, multisectoral Research Centre of Excellence dedicated to advancing Africa's energy transition. By bringing together government, industry, and academia, CEPREC drives interdisciplinary collaboration to develop cutting-edge knowledge and skills that leverage circular economy principles, to support Africa's energy transition.

CEPREC is funded by the UK Government's Ayrton Fund, a £1 billion initiative supporting clean energy research and innovation

# Vision

To be the leading research centre driving new knowledge, innovation, skills empowerment, and policy development that leverages circular economy principles to enable Africa's transition to a resilient, inclusive, and sustainable energy future.

# Mission

CEPREC is committed to driving the circular economy in renewable energy across Africa. Through groundbreaking research, strategic partnerships, and capacity building. We aim to repurpose technology, inspire sustainable practices, and develop skilled leaders who will advance energy access, economic growth, and environmental stewardship across the continent.

CEPREC

# Empowering Africa's Energy Transition by:

### Creating New Knowledge
Leveraging the circular economy to drive clean energy innovation.

### Building Capacity
Training the next generation of energy leaders across Africa.

### Influencing Policy Development
Shaping sustainable energy policies for long-term impact.

# Our Approach

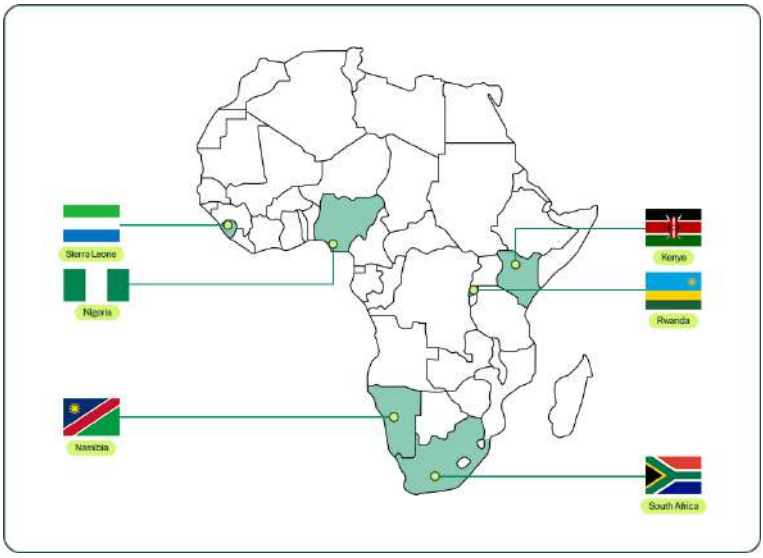
CEPREC

## Triple Helix Model

We believe the key to advancing  Africa's energy transition lies in collaboration. Our Triple Helix model approach unites academia, industry, and government to drive innovation and real-world impact in renewable energy.

## Pan-African

We recognize that Africa's energy challenges vary by region, economy, and infrastructure. That's why we have strategically partnered with six diverse countries, spanning East, West, and Southern Africa to develop scalable, inclusive, and locally adapted clean energy solutions.

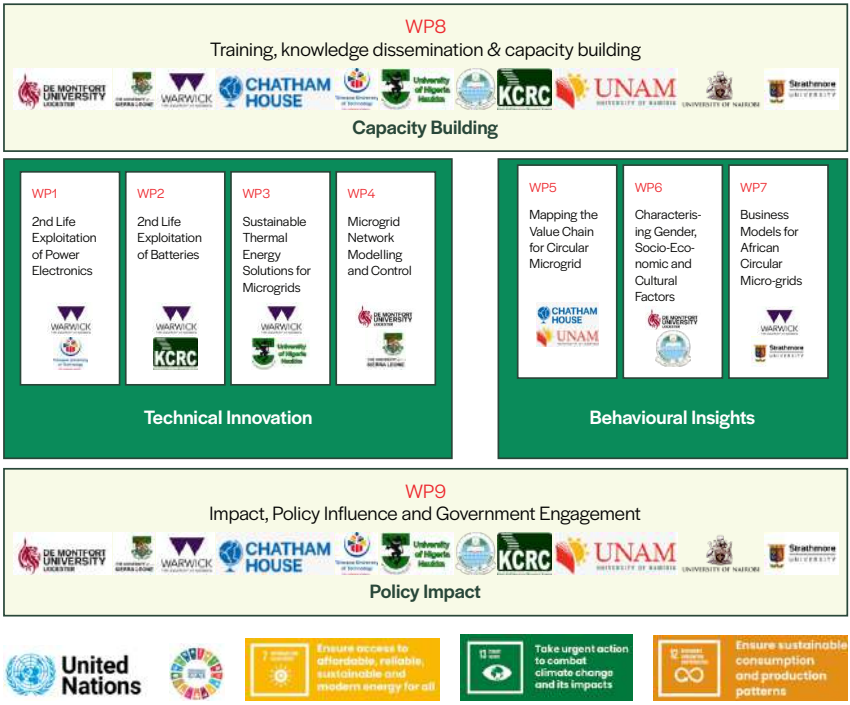


# Our Approach

CEPREC

## Interdisciplinary

We combine engineering, policy, business, Economics and social sciences to develop circular energy solutions that work.




### Technical Innovation

Pioneering solutions to repurpose end-of-life materials for microgrids. WP1-4

### Behavioural Insights

Understanding consumer behaviour to drive adoption. WP5-7

### Capacity Building

Strengthening local expertise with knowledge and skills. WP8

### Policy Impact

Informing and supporting policies for sustainable energy access WP9

# Global Dialogue for Local Impact: CEPREC at Chatham House

CEPREC kicked off with a high-level multisectoral roundtable at Chatham House, London— bringing together international stakeholders to accelerate Africa's energy transition.

## Highlights included:

- Dialogue with High Commissioners from partner countries
- Insights from FCDO, African Development Bank, Acumen, and IRENA
- Engaging conversations on finance, circularity, capacity building, and policy gaps


CEPREC at Chatham House: Shaping global conversations for local energy solutions.

> CEPREC is not just a research centre—it's a movement grounded in partnerships, policy, and practical change ”

CEPREC

# Stakeholder Engagements

## Partnering with Policymakers for Lasting Impact

CEPREC works hand-in-hand with national governments to ensure that distributed renewable energy solutions align with country priorities. Ministries from across the continent sit on our Advisory Board, shaping policy pathways for sustainable electrification. These partnerships translate research into national energy strategies, regulatory frameworks, and practical roadmaps — accelerating Africa's transition to a sustainable and inclusive energy future.


## Driving Innovation with Industry Leaders

From renewable energy companies to technology startups and SMEs, CEPREC partners with industry to turn research into real-world solutions. Our collaborators provide critical insights, testing grounds, and pathways to market. Together, we are shaping business models that empower local enterprises, lower costs, and create green jobs — while tackling Africa's urgent energy needs.

CEPREC

# Stakeholder Engagements

## Grounding Solutions in Community Realities

CEPREC's work is people-centred. We partner with civil society organisations, NGOs, and local communities to ensure that our innovation reflect real social, cultural, and economic needs. Our Collaborations ensure inclusivity, gender equity, and community ownership. These partnerships make CEPREC not just a research centre, but a movement for equitable, accessible, and sustainable energy across Africa.

CEPREC

# Powering Progress:
# The Circular Microgrid Concept

## The Energy Access Challenge in Africa

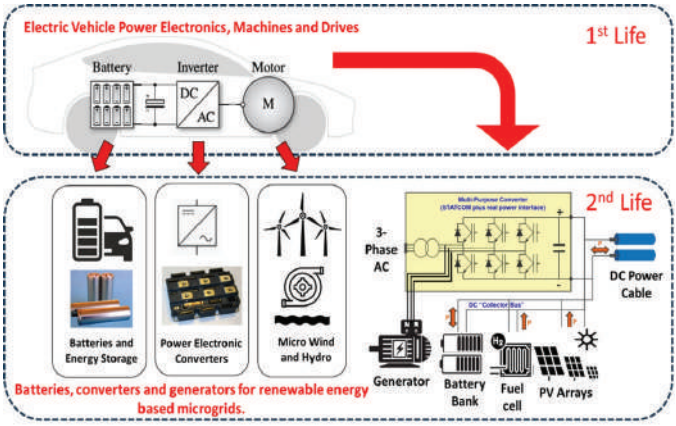
Across sub-Saharan Africa, over 50% of people lack access to reliable electricity. In rural areas, access can fall below 10%. This lack of energy infrastructure limits opportunities for healthcare, education, livelihoods, and economic growth.

The conventional model—expanding national grids—is expensive, slow, and often impractical for remote areas. New solutions are needed.

## CEPREC's Solution: Circular Microgrids

- At CEPREC, we are pioneering circular microgrids—small, decentralised energy systems powered by renewable sources and built using repurposed technology.

  Instead of relying on expensive, imported components, we give second life to batteries, motors, and inverters recovered from electric vehicles and other sources. These are tested, refurbished, and integrated into microgrids that supply affordable, reliable, and sustainable energy.




## How Circular Microgrids Work

### 1 Second-Life Technology

We repurpose:

- EV Batteries for local energy storage
- Converters & Inverters for energy regulation
- Electric Motors for microgeneration systems

This reduces costs and diverts e-waste from landfills.

CEPREC

# Powering Progress: The Circular Microgrid Concept

**2** Clean Energy Generation

Circular microgrids use solar, wind, hydro, and even thermal energy systems, integrated with second-life components.

**3** Localised Distribution

Power is delivered directly to homes, schools, clinics, and small businesses, offering independence from unstable national grids.

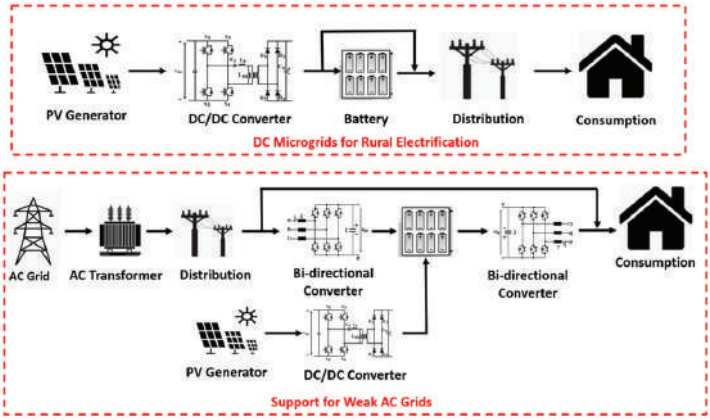
**4** Smart Controls

Advanced control systems optimise generation, storage, and usage to maximise efficiency and reliability.

## Scalable Solutions for Africa's Needs

CEPREC is deploying three key types of circular microgrids:

- Off-Grid Microgrids
  Designed for rural communities with no grid access using solar PV and repurposed batteries for affordable, standalone systems.
- Grid-Connected Microgrids
  Operate alongside the national grid, improving reliability and providing backup during outages.
- Interconnected Community Microgrids
  Clustered microgrids that support local economies, improve energy sharing, and strengthen resilience.

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# Our Impact

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## 1 Lower Energy Costs for Communities

By repurposing end-of-life electric vehicle (EV) components into Distributed Renewable Energy Systems, CEPREC is:

- Reducing the cost of power generation and storage
- Bringing reliable electricity to underserved and off-grid communities
- Supporting affordable energy access for homes, schools, and businesses

## 2 Tackling E-Waste Through Circular Solutions

CEPREC's approach prevents waste and promotes reuse by:

- Giving batteries, inverters, and motors a productive second life
- Reducing environmental and health risks linked to unmanaged e-waste
- Supporting local repair, recycling, and remanufacturing ecosystems

# Our Impact

## 3 Building Skills & Local Capacity

We're committed to empowering Africans to lead Africa's energy future:

- Training engineers, researchers, and technicians in Distributed Renewable Energy Systems
- Strengthening institutional capacity in universities and innovation hubs
- Creating jobs in energy, electronics reuse, and circular economy sectors

## 4 Influencing Policy & Driving Systemic Change

CEPREC works closely with governments, regulators, and international bodies to:

- Develop enabling policies that promote Distributed Renewable Energy Systems
- Align financing, regulation, and technology with local realities
- Support long-term adoption and integration of sustainable energy systems

# Our Impact

## 5 Promoting Inclusive Development

Our work is centred on people and equity:

- Designing solutions that benefit women, youth, and marginalised groups
- Supporting energy access for income-generating and community activities
- Ensuring that every intervention reflects social, economic, and cultural contexts

## Director

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## Deputy director - Engineering

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## Co-Investigators

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**Frank Adeeko**
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**Amkela Ngwenya**
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