Electric Mobility in Africa - *Promoting an enabling environment for electric mobility*

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[www.uYilo.org.za](http://www.uYilo.org.za)
Mobility solutions in electric
eMobility Infrastructure - Charging options

**Mobile:** Charge time 6 - 8 hours

**Public:** Charge time 1 - 6 hours

**Residential:** Charge time 6 - 8 hours

**Public:** Fast Charging 15 - 30 minutes
eMobility Infrastructure - Vehicle-to-Everything (V2X)

- V2V - Vehicle-to-Vehicle: Alerts one vehicle to the presence of another. Cars "talk" using DSRC technology.
- V2D - Vehicle-to-Device: Vehicles communicate with cyclists' V2D device and vice versa.
- V2P - Vehicle-to-Pedestrian: Car communication with pedestrian with approaching alerts and vice versa.
- V2H - Vehicle-to-Home: Vehicles will act as supplement power supplies to the home.
- V2G - Vehicle-to-Grid: Smart grid controls vehicle charging and return electricity to the grid.
- V2I - Vehicle-to-Infrastructure: Alerts vehicles to traffic lights, traffic congestion, road conditions, etc.
Energy Efficiency with Electric Vehicles

Source: SANEDI

<table>
<thead>
<tr>
<th>Process</th>
<th>Oil Well</th>
<th>Refinery</th>
<th>Distribution</th>
<th>Petrol Car</th>
<th>(W→W)η</th>
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</thead>
<tbody>
<tr>
<td>Efficiency (%)</td>
<td>96%</td>
<td>90%</td>
<td>97%</td>
<td>18%</td>
<td>15%</td>
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<table>
<thead>
<tr>
<th>Process</th>
<th>Coal Mine</th>
<th>Synfuel Plant</th>
<th>Distribution</th>
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<th>(W→W)η</th>
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<tbody>
<tr>
<td>Efficiency (%)</td>
<td>97%</td>
<td>40%</td>
<td>97%</td>
<td>18%</td>
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<table>
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<tr>
<th>Process</th>
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<th>Power Station</th>
<th>Distribution</th>
<th>Electric Car</th>
<th>(W→W)η</th>
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<tbody>
<tr>
<td>Efficiency (%)</td>
<td>97%</td>
<td>35%</td>
<td>95%</td>
<td>75%</td>
<td>24%</td>
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<table>
<thead>
<tr>
<th>Process</th>
<th>Solar Farm</th>
<th>Distribution</th>
<th>Electric Car</th>
<th>(W→W)η</th>
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<tbody>
<tr>
<td>Efficiency (%)</td>
<td>95%</td>
<td>95%</td>
<td>75%</td>
<td>71%</td>
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</table>

Source: SANEDI
Electric Vehicle Battery Solutions

- **Reuse**
  Using EV battery packs for grid storage application

- **Refabricate**
  Involves dismantling the EV battery packs, assessing each cell, then remanufacturing a reconditioned battery pack

- **Recycling**
  Actual recycling of cell chemistry
uYilo e-Mobility Technology Innovation Programme

• ‘uYilo’ - Local Xhosa word meaning to ‘create’ - a new industry - Electric Mobility

• Established in March 2013 through national government initiative of representing a national multi-stakeholder programme across both public and private sector

• Mandate to enable, facilitate and actively mobilise eMobility through national integration, government lobbying (policies, regulations), thought leadership, eMobility community cohesion and impact, and stronger industry linkages both local and international
uYilo e-Mobility Programme Eco-System

Enabling, Facilitating and Mobilising the South African eMobility EcoSystem

Source: P3 Engineering (Pty) Ltd
Multi-Departmental Approach

Science & Technology
- Support Primary Research
  - Energy storage & advanced propulsion
- Research pipe to be commercialised storage testing centre (can become hub in Energy Storage Programme) & other engineering services
  - Joint projects to promote low carbon mobility
- Fuel policies
  - Cleaner Mobility Programme
  - International Energy Agency

Transport
- Legislation through NRCS
  - Green Transport Strategy
  - NMT Strategy
- Advise DOT on relevant plugs and charging protocols; UYILO development of standards required for infrastructure

DTI
- Drivers of EV Industry in SA through roadmap (IPAP)
  - Incentives; Supplier Development; Infrastructure Planning & Development; Market stimulation
- Collaborative project to meet KPA (such as infrastructure development & storage technologies) UYILO responsible for execution

Climate Mitigation

E-Mobility Programme
- Technology innovation
  - Small scale demonstrations; R&D; Engineering Services & Co-ordination
- Business models, services & products for funding by IDC
- Funding for new EV Enterprise

Champion for eMobility
To create a favorable environment to enable the use of clean mobility in South Africa.

To support the development of policy and regulatory framework.

To promote technologies for E-Mobility and sustainably integrate them into smart cities in South Africa.

To support the introduction of sustainable mobility into the urban transportation mix.

To create awareness of EVs in South Africa.

To promote co-operation and trust amongst public private sector.

www.evia.org.za
uYilo Facilities and Services

- **National Accredited Battery Testing Laboratory**

- **Electric Vehicle Systems Laboratory**

- **Live Testing Environment - Research, Testing, Development and Demonstration**
uYilo Kick Start Funding

Agile mechanism to fund applied research and development that will lead to creation of products and services

Foundation of Automotive Tier1/2 component suppliers towards local eMobility industry value chain

Aligned to APDP of the dti - component localisation incentive for future OEM’s

Localization towards SA’s development of eMobility EcoSystem technologies
uYilo Pilot Projects

Field Testing Programme - OEMs

Off-road electric vehicles

Micro electric vehicles uses

Electric Bike sharing pilot
uYilo Smart-Grid Pilot Project

- Solar energy **Generation** (12kWp)
- **Distribution** through multiple charger network (AC charge points, DC fast charger, V2G)
- **Energy Management System** (IEC 61850 implementation)
  - *Supply* side management - Sourcing from grid, solar, storage
  - *Demand* side management - *Dynamic, individual* charge point load levelling
  - *Time-of-use* for optimised charging profiling during peak times
  - *Phase Balancing* - Reduced load onto local micro grid network
South African landscape of eMobility

**eVehicles Sales:**
National Sales (2013 - April 2017)
Hybrid 2,500
EV (Nissan and BMW) 355

New market entrants:
Jaguar, Audi, Volvo

**Infrastructure deployment:**
95 public charging stations (Oct 2016)
- 12 national cities
- 77 standard chargers (green)
- 18 fast chargers (blue)
African Mobility Start-ups

Significant development of startups in South Africa, Nigeria and Kenya

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<tr>
<th>P2P USED CAR MARKET PLACE</th>
<th>CYBERSECURITY</th>
<th>MOBILITY INTEGRATION</th>
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<tbody>
<tr>
<td>carzar</td>
<td>Snode</td>
<td>Little</td>
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<tr>
<td>Jumia Car</td>
<td>Verity.</td>
<td>pargo</td>
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<td>Cormudi</td>
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<td>KaChing</td>
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<tr>
<th>UBI (USAGE BASED INSURANCE)</th>
<th>AFTERMARKET TELEMATICS</th>
<th>ELECTRIC VEHICLES</th>
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<tr>
<td>Discovery Insure</td>
<td>sure telematics</td>
<td>KANTANKA</td>
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<td>UyiLO</td>
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<th>BLOCKCHAIN</th>
<th>DRIVER SAFETY</th>
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<tr>
<td>BitPesa</td>
<td>Clad Light</td>
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<tr>
<td>bitland</td>
<td>CRASHDETECH</td>
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Source: Frost & Sullivan
Africa’s opportunity for electric mobility industrialization

- Southern Hemisphere regions are well endowed with some of the minerals for eMobility technologies
  - Democratic Republic of Congo has large reserves of Cobalt supplying global markets
  - South Africa has the second-largest reserves of manganese in the world
  - Zambia has the largest reserves of copper in Africa
  - Zimbabwe has the fifth-largest lithium reserves in the world

- Global participation exists through strategic mining, processing and beneficiation of these minerals

- Opportunities exist to participate actively in the global value chain as one of the key suppliers
Africa’s opportunity for electric mobility industrialization

- Lithium-ion battery manufacturing
- Niche mobility markets in Africa:
  - Micro-mobility vehicles
  - Utility vehicles
  - Agriculture mobility applications
  - Mining mobility applications
  - Tourism mobility applications
- Skills Development (High Voltage for Hybrid and Electric Vehicles)

  - Reduced air pollution
  - Reduced greenhouse gas emissions
  - Reduced fuel costs
  - Creation of jobs – Local assembly/manufacturing
  - Creation of new off grid opportunities in rural areas
Botswana - Chobe Game Lodge

Over the course of four years Chobe Game Lodge have converted 5 vehicles and 4 boats from conventional diesel and petrol burners to Electric drive.

Electric Vehicles have covered a combined total of 125,040 km’s, saving 22,329L of diesel and just over 58,725 Kg of CO2 emissions @ 5.6 km per L diesel.

Electric boats (EB’s) have done over 7,818 hours, saving 3,636 L petrol @ 2.15 L an hour, giving another 8,435 Kg of CO2 emission saving.
'Made in Uganda' Electric Car - Kiira Motors Corporation

KAYOOLA SOLAR BUS

KIIRA EV POC

KIIRA EV SMACK
Thank You * Asante

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