UYILO
E-MOBILITY PROGRAMME
enabling electro-mobility innovation

Hosted by:
NELSON MANDELA UNIVERSITY

An initiative of:
technology innovation AGENCY

# Facilities, Services, Projects and Activities

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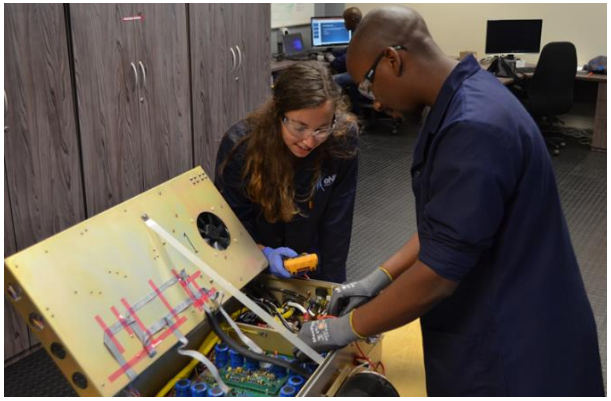
# uYilo Electric Mobility Programme

The national uYilo e-Mobility Technology Innovation Programme was established in 2013 to serve as a **multi-stakeholder, collaborative** programme focused on **enabling**, **facilitating** and **mobilising** the electric mobility sector growth within the transport, and complimentary green economy sector in South Africa.

Aligned to **global technology advancements** across **transport**, **energy** and **ICT** that e-Mobility impacts on, uYilo has created a footprint in the local industry, while also leveraging on international exposure, towards advancing the uptake of e-Mobility from **government lobbying, industry cohesion**, **enterprise development, pilot projects, thought leadership** and **skills development**

# uYilo Electric Mobility Programme Ecosystem

# Facilities and Services: Electric Vehicle Systems

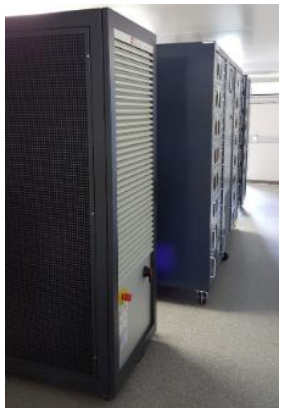


The facility provides mobility platform development and integration of all products across the e-Mobility spectrum from a variety of global suppliers to accelerate the deployment of electric vehicle technologies in South Africa. In order to establish a benchmark and help set future technological goals, new technologies are evaluated and integrated from the component level to the vehicle system level for optimal performance and application. uYilo provides support for electric mobility platforms while evaluating current and future technologies for electric vehicle components to aid in the implementation of advanced technologies to expand market applications. The facility additionally provides skills development along the associated high voltage systems within electric vehicles.

# Facilities and Services: Accredited Battery Testing

## Lead Acid Batteries

- Capacity Testing
- Reserve Capacity Testing
- Cranking Performance Testing
- Charge Acceptance Testing
- Charge Retention Testing
- Endurance Testing
- Water Consumption Testing
- Vibration Resistance Testing
- Electrolyte Retention Testing
- Post mortem (Teardown) Analysis



sanas Testing Laboratory T0676

**ISO 17025 Accredited**

**SANS 2:2013**
**SANS 60095-1:2007**
**IEC 60095-1:2006**

## Lithium-ion Cell, Module

- Discharge performance
- Charge retention and recovery
- Cell and battery internal resistance
- Endurance

**IEC 62620:2014**

IEC SABS STANDARD Battery Council International NISSAN RENAULT

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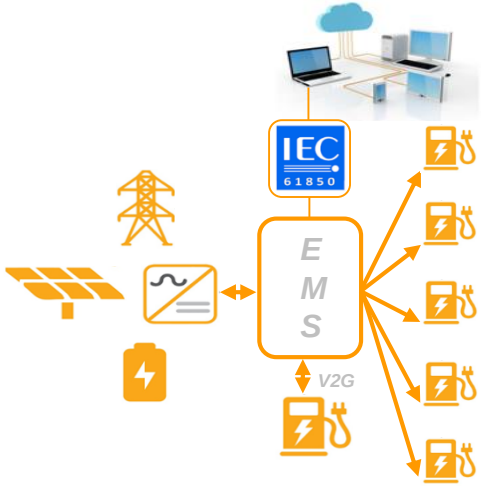
# Facilities and Services: Smart Grid Ecosystem for Electric Mobility

The Live Testing Environment creates a platform for the Electric Vehicle Ecosystem to facilitate universal connectivity between electric vehicles and supportive smart grid infrastructure. The facility supports demonstration and analysis of electric vehicles, and development of infrastructure technologies to aid in the advancement of technologies to expand their commercial applications. The facility provides important insight into usage profiles and energy requirements, as well as providing valuable information for OEMs, utility and energy companies, to further validate and optimize electric vehicle charging patterns and energy management.

# Facilities and Services: Smart Grid Ecosystem for Electric Mobility




The smart grid infrastructure consists of various electric vehicle ecosystem elements such as electric vehicles, a mix of AC charge points, DC fast chargers and Vehicle-to-Grid system capabilities. Renewable energy is incorporated to supply the charger network and is dynamically controlled through a supervisory Energy Management System for individual charger energy profiling. Energy storage is achieved through repurposed electric vehicle battery packs serving as ‘second life’ applications under stationary storage. The smart grid network management system is aligned to global protocols in order to support future innovative developments. The facility allows incubation and demonstration activities that will provide critical data to the development and commercialization of next-generation vehicles and supportive smart grid infrastructure.

NISSAN BMW i. Mercedes-Benz Eskom efacec MENNEKES MAGNUM CAP ELECTRICAL POWER SOLUTIONS GridCars MICRO CARE mlt INVERTERS NUVVE wallbox

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# Projects and Activities: Tuk-Tuk Conversion



The Mandela Bay Development Agency (MBDA), in collaboration with uYilo embarked on a project to introduce and promote the concept of electro-mobility, a phrase referring to alternative electric based modes of transportation designed to shift vehicle design away from the use of fossil fuels and carbon gas emissions. The MBDA requested the conversion of its tuk-tuks into electric drive units. The tuk-tuk auxiliaries like indicators, hazards, brake lights were untouched and still operates as before. The vehicle is equipped with two 100W high voltage solar panels to aid in charging the main battery pack to increase its range and to create awareness.

# Projects and Activities: Electric Bike Sharing

As one of the initiatives of uYilo in demonstrating various e-Mobility modes and concepts, a fleet sharing scheme using electric bicycles (e-Bikes) has been deployed at the Nelson Mandela University North and South Campus.

The sharing scheme allows staff and students the opportunity for use of intercampus transport by use of e-Bikes available in the fleet. Each e-Bike charge station supply power is generated via solar which provides a renewable energy source towards a green transport solution. The online reservation and monitoring system developed within uYilo provides ease of reservation of the service to all users. The project has included a locally engineered and developed solution incorporating multiple local suppliers and manufacturers.

# Projects and Activities: Micro-mobility Demonstrator

The demonstrator is a living lab to pilot the use of electric mobility within utility platforms and people movers in real world applications. It aims to prove viability, create awareness and collect data to assist with establishment of commercial processes. The project targets the replacement of standard vehicle platforms used in the provision of horticulture and technical services on Nelson Mandela University's Summerstrand campus. Both these departments make use of small light duty vehicles to move around on campus. The use of micro electric mobility platforms in these applications have reduced the initial capital and running cost of these fleets.

# Projects and Activities: Gameviewer - Eco Tourism



The aim of the project was to demonstrate the use of electric mobility as part of safari mobility operations. Micro electric vehicle platforms provided by Imperial Green Mobility were hosted at Shamwari Game Reserve for use in their mobility operations. The intent was to create awareness, test performance of electric mobility in different roles and determine the feasibly of e-Mobility for ecotourism industries.

# Projects and Activities: Field Testing Programme



uYilo has partnered with OEM's to utilize 100% electric models as part of a field testing programme.The vehicles are utilized to determine local user patterns, usage modes and energy cycles, which therefore allows facilitation of the development of multiple supportive technologies. The deployment of these platforms will service to identify technology gaps, test new business models and eliminate interoperability issues between ecosystem components. Emphasis will be placed on creating credible data that can be used for marketing purposes and to create awareness of e-Mobility as a viable alternative.

# Enterprise Development : uYilo Kick Start Funding

The uYilo “Kick Start” fund was established to support electric mobility (e-Mobility) related projects by providing an agile mechanism (approval within 3 months) to fund applied research and development to a maximum of:

(i) R500,000 (including VAT) per project for individual projects (one participant), and

(ii) R1,000,000 (including VAT) per project for collaborative projects (multiple participants).

For collaborative projects matched (50:50) co-funding is required.

The grant funding is focused towards applied research and development that will accelerate Technology Readiness Levels (TRL) and lead to the creation of products or services that can be commercialised to advance the e-Mobility industry in South Africa. The funding aims to fast track the development processes for projects that have not attracted funding from other funding mechanisms but have strategic importance to the local e-Mobility industry value-chain. Shortlisted projects will have to demonstrate the intent to further develop and commercialise the technology into market.

Funding call is now open until 15 November 2019 visit: http://uyilo.org.za/uYilo-Kick-Start-Fund for more information.

# Enterprise Development: Kick Start Funding Previous Beneficiaries

UNIVERSITY of the WESTERN CAPE

14kW li-ion Mining Vehicle Battery Pack

GridCars™

OCPP Charge Point and Server

POWERMOTE

- Utility vehicle motor and controller
- 4x4 utility vehicle

UNIVERSITEIT STELLENBOSCH UNIVERSITY

mellowcabs

Intelligent Battery Management System, Charger, Drive System

mlt INVERTERS

Karoo70 for second life EV battery applications

BPI BATTERY POWER INDUSTRIES

18650 Cylindrical cell battery pack module

**Ubun2Tech**

Four-wheel RE-Link1 Electric Trailer

iet Solar Electricity

Electro-Mobility and Residential Storage Integration

INTELLIGENT MACHINES

Induction Motors and controllers for Kinetic Recovery System

MICRO CARE

50kW Three-Phase DC EV Fast Charger

QB Software

EV BackOffice

Electric Vehicle Charge Point Back Office System

EWIZZ ELECTRIC VEHICLES

Development of core EV management system, unit, cloud

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# Automotive Industry Supporting Services

## Engineering Design and Analysis

- Computer Aided Design
- Analysis (CAE Services)
- FEA analysis (simulation)
- Component optimization
- Product optimization
- Accurate CAD conversion
- 2D/3D drafting and part detailing
- 2D to 3D Design translation
- Part design verification
- Failure simulation/investigation

## Prototyping and Manufacturing

- 3D printing
- EDM Wire cutting
- EDM Die sinker
- 5-Axis CNC
- CNC- Turning & Milling
- Water-jet cutting

## Portable 3D scanning and Optical CMM

- Scan based design
- Quality and control analysis

## 6-Axis Robotic Laser Cell

- Laser welding
- Laser cladding
- Laser cutting

## Mechanical Testing

- Hardness
- Tensile
- Fatigue

## Chemical Testing

- Carbon and Sulphur analyser
- Spectrometer
- Salt spray testing

## Optical Microscopy and Scanning Electron Microscopy

- Failure surface analysis
- Micro structure analysis
- Weld penetration analysis
- Coating thickness verification

## Residual Stress Analysis

- Portable X-Ray diffraction
- Portable High Speed Hole Drilling

## Engine and Powertrain Testing

- ROTOTEST 4WD Powertrain and Chassis Dynamometer
- Froude Hofmann Eddy Current Engine Dynamometer

## Lead-Acid Battery Testing

- Capacity Testing
- Cold Crank Ability (2,000A)
- Endurance tests for batteries
- Charge Acceptance
- Charge Retention
- Water consumption
- Vibration resistance
- Electrolyte retention tests
- Post mortem analysis

## Lithium-ion Cell Testing

- Pouch, Prismatic, Cylindrical, button cell testing
- Impedance analysis

## Materials Characterisation

- X-ray diffraction
- X-ray fluorescence
- Partial Size Analysis
- Melt flow indexing
- Surface area analysis

# Thank You * Re a leboga * Siyathokoza * Enkosi
# Siyabonga * Re a leboha * Ro livhuha * Ha Khensa * Dankie

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Eskom

sanedi
South African National Energy Development Institute

AUTOX

NISSAN

BMW i

Mercedes-Benz

IMPERIAL™
GREEN MOBILITY

eNtsa
innovation through engineering

UNIDO

LOW CARBON TRANSPORT SOUTH AFRICA

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