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An initiative of:



uYilo eMobility Technology Innovation Programme

Presenter: Prof Ernst Ferg (Chemistry)

Faculty: Engineering (Mr Hiten Parmar)

Contact details: hiten.parmar@nmmu.ac.za

uYilo eMobility Technology Innovation Programme

- Initiated in 2013, a national multi-stakeholder technology development programme to support the creation of products and services for the e-Mobility industry
- Provide Engineering Services, Specialised Facilities, Seed Funding
- Co-ordinate e-Mobility Projects and Initiatives
- Seeks to create multi-disciplinary teams that encompass academia, industry and government to support the EV industry in South Africa

**Key focus areas: battery technologies / systems,
charging systems / grid integration and drive train technologies,
enveloped by skills development**

Electric Mobility (e-Mobility)

WHAT?

- Electric Mobility (e-mobility) refers to the use of electric drive for the fulfilment of different individual mobility needs

WHY?

- Reduction of Green House Gas (GHG) emissions – culprit in global warming; and to stabilize human-induced climate change
- Achieve energy independence – transition from oil and coal towards sustainable technologies such as wind and solar

HOW?

- Innovative Electric Mobility solutions
- Convenient charging infrastructure
- Smart grid interface
- Efficient energy management

e-Mobility variations

Types:



Human transporter - e-bicycle - electric motorcycles - personal mobility vehicle - purpose built

e-Mobility Infrastructure

Residential Garage:

Reduces charging time by 50% over level I charging solutions.

Fast-charging Stations:

Charge 80% of the battery in less than 30 minutes.

Retail Parking Lots:

User identification to ensure only authorized customers have access to charging stations.

Fleet Charging:

Energy management and remote monitoring capability in one complete solution.

Private Company Parking:

Free or pay-per-use services for employees and visitors.

Public Parking Garage:

Convenient public charging solutions along with payment options.

Public Parking:

Public charging provides easy access to recharge vehicles, combining parking and charging facilities in the same infrastructure.



Choose the color of your energy!

Source: Schneider Electric

e-Mobility Infrastructure

UK's Electric Vehicle highway charging lanes



Source: Highways England

Dynamic Wireless Power Transfer (DWPT) systems on the Strategic Road Network (SRN)

Battery Swap Stations

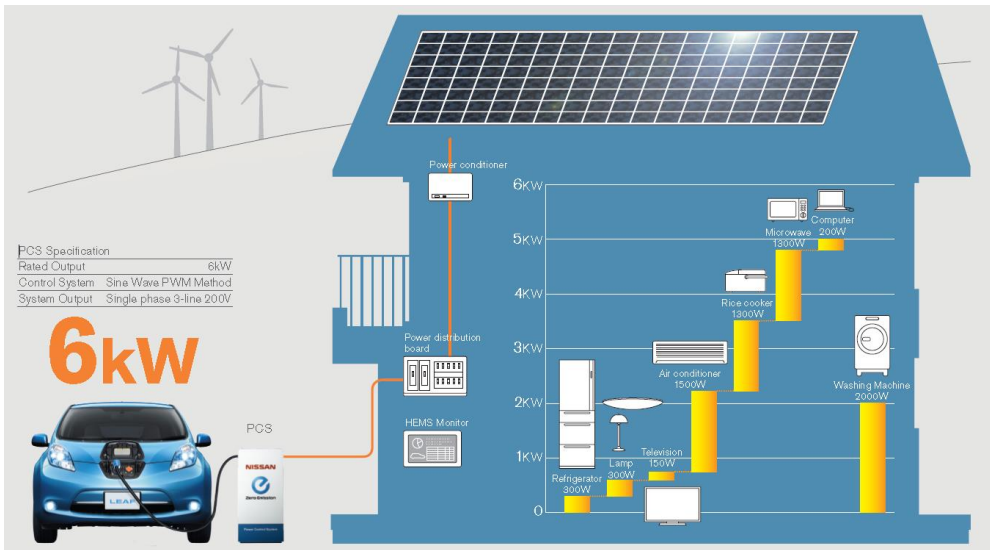


Source: Phoenix Contact

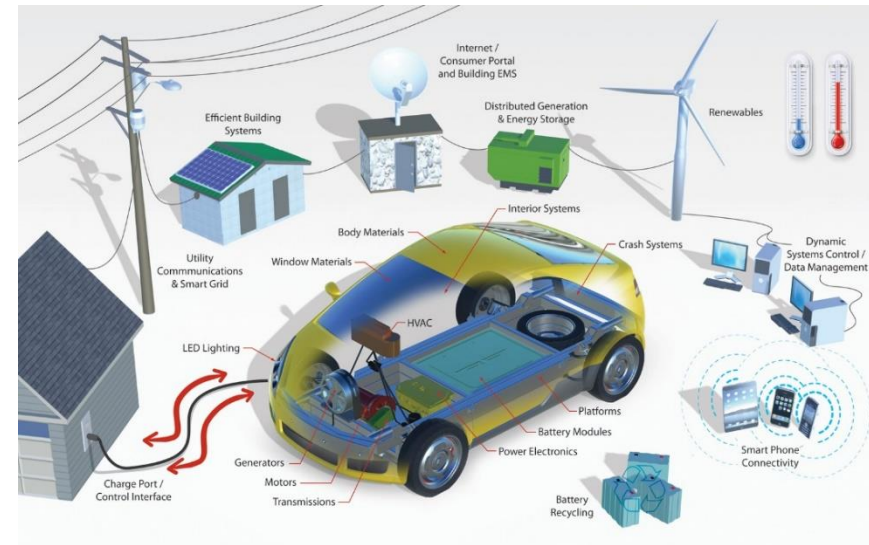
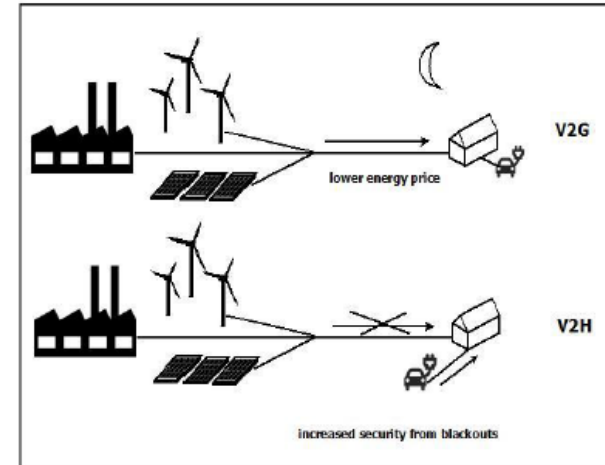
Port city of Qingdao, China, battery units of over 40 buses are replaced two or three times each day

Vehicle-to-Home (V2H) technologies

Source: Nissan



BENEFITS FOR EV USERS

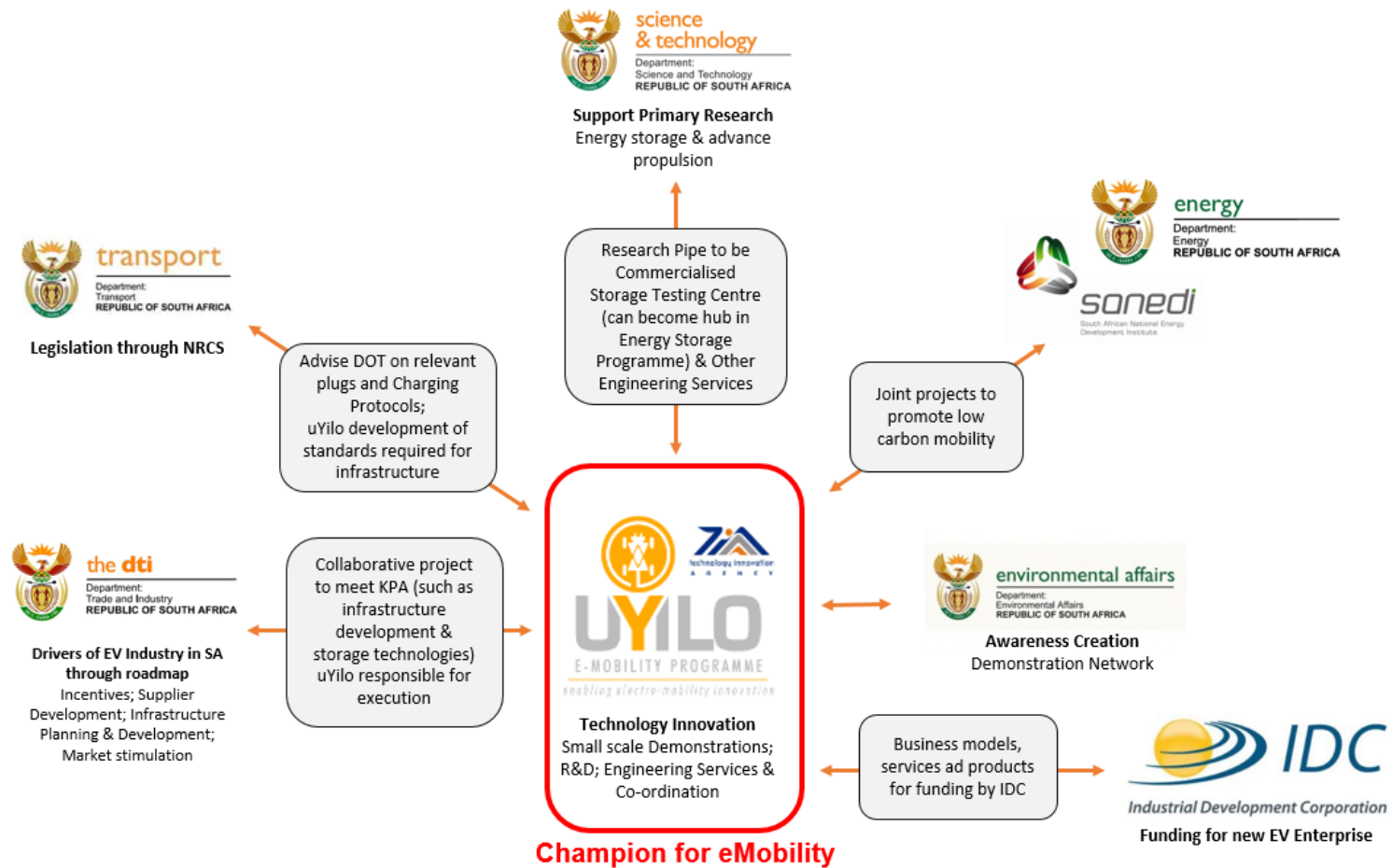


e-Mobility Technologies



Source: P3 Engineering (Pty) Ltd

uYilo's Multi-Departmental Approach



uYilo Activities

1. Battery Testing Centre
 2. EV Systems lab for component support
 3. Live Testing Environment for Demonstrations and R&D
- Electric Vehicle Infrastructure Alliance (EVIA)
Public Private Sector consortium to shape and stimulate the local EV environment which seeks to avoid fragmentation
 - SABS working group representation
EV charging standards
Battery systems
 - uYilo Kick Start Fund
An agile mechanisms to fund demonstration, product development or research in:
 - Battery Storage
 - Charging Networks
 - Niche EV Components



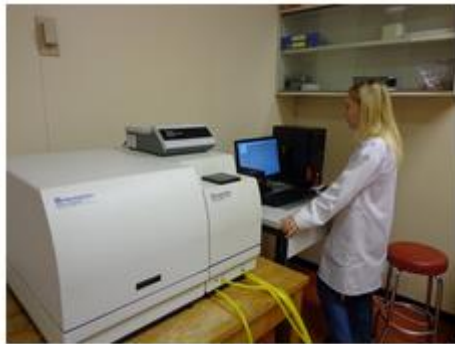
Battery Testing Laboratory



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Activities

- National accredited testing services – SANS Approved; ISO 17025
- Lead acid battery testing
- Material characterization services
- Research opportunities into novel batteries and related materials



Battery Testing Laboratory

Independent Battery testing laboratory facility - a national accredited facility to support energy storage solutions across a wide range applications

Equipment:

- Bitrode 0-18V Battery cycle tester (16 x 100A channels)
- Water baths testing (up to 80°C)
- Freezer unit (-40°C)
- Bitrode high rate discharger (2,000A)
- Vibration table for up 15-30 kg battery with 30 m.s⁻² at 35Hz
- Inert atmospheric glove box



Expansion to li-ion cell testing

- Li-ion Cell Tester
- Li-ion Button Cell Tester
- Environmental Chambers



Battery Technology Research Activities

- Cathode material used in Li-ion batteries (PhD)
- Positive plate lead dioxide material in lead acid batteries (M Level)
- Carbon based additives to the negative plate of the lead acid battery (M Level)
- Construction of Aluminum-Air battery
- Influence of magnetic fields on electrolyte in lead-acid batteries

EV Systems Laboratory

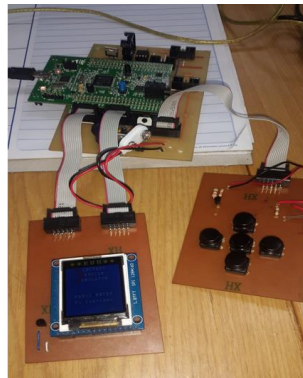
Objectives

- Provide a platform to facilitate EV compatibility with products from a variety of global suppliers
- Support from component level to the vehicle system level
- Evaluate current and future technologies for EV components



EV Technology Research Activities

- Development of convenience charger with vehicle pilot control for Leaf
- EV simulator for commissioning of charge stations
- A modular, portable, li-ion battery pack with bms (48V)
- OCPP protocol implementation onto an in-house developed charge station
- Live vehicle fleet management platform for the uYilo EV fleet
- Mobile app for fleet vehicles



Home

User Name

Trip Details

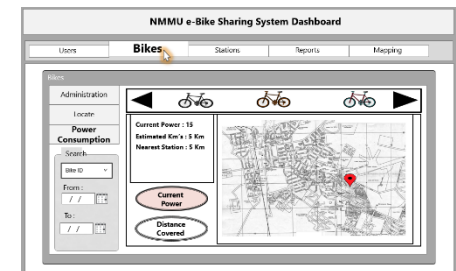
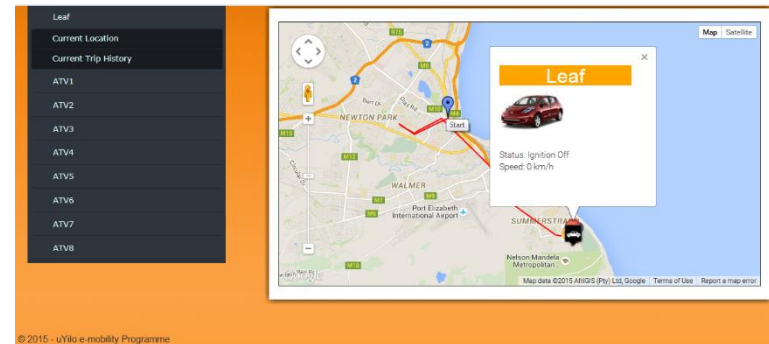
Date

Start Time End Time

Start SOC End SOC

Start Mileage End Mileage

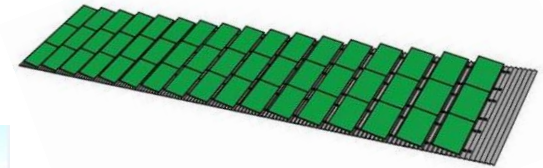
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Live Testing Environment (LTE)

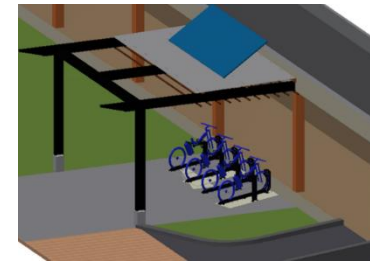
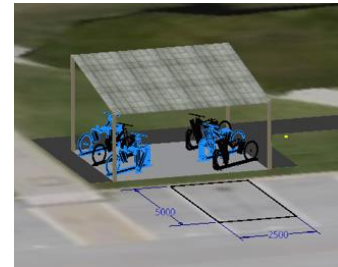
Objectives

- Simulator for the EV ecosystem
- Consists of EV fleets, various charging stations, IT backbone for data aggregator and other supporting systems
- Creating a collaborative platform for all players
- Demonstrate practical issues on standard interfaces for integration
- Field Testing Programme (OEM EVs, micro EVs & e-bikes)
- Renewable energy micro-grid for charging EV's

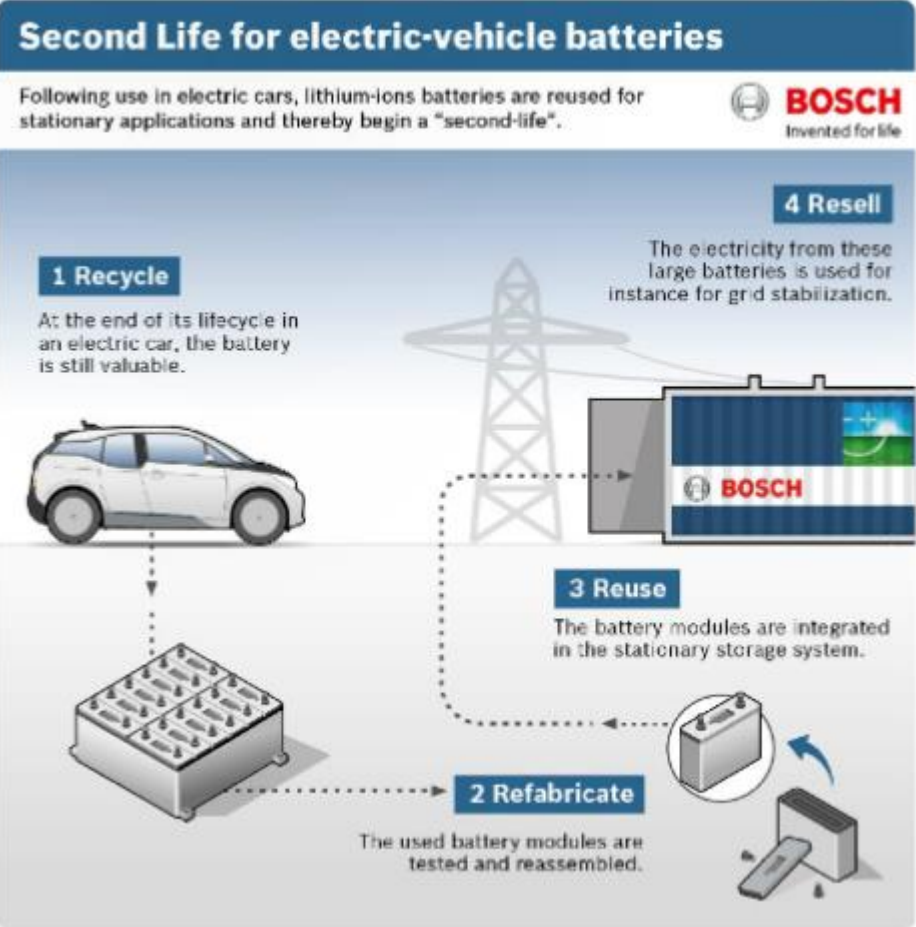
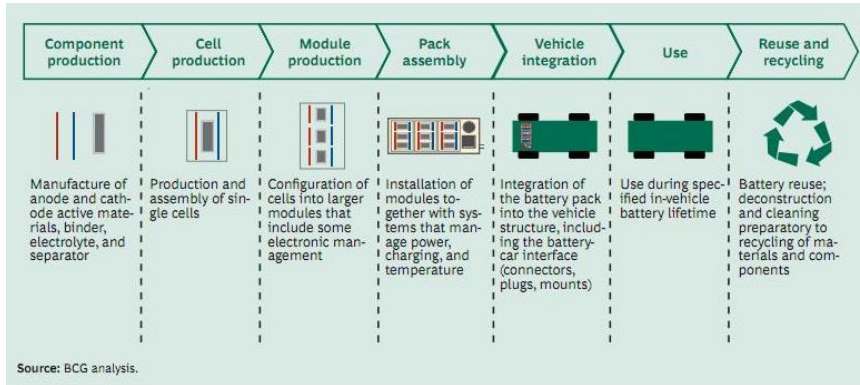


LTE Projects

- Field Testing Programme – *Nissan SA*
- Demonstrate micro EV uses – *Imperial Green Mobility, NMMU*
- Demonstrate EVs off-road – *Shamwari, SANEDI, Imperial Green Mobility*
- Solar charging e-Bike fleet sharing – *tracking, reservation*



EV Battery Solutions



Source: Charged EV

- **Recycling**

This is the actual recycling if li-ion cell chemistry

- **Refabricate**

This involves dismantling the EV battery packs, assessing each cell, then remanufacturing a reconditioned battery pack

- **Reuse**

This involves using EV battery packs for grid storage application

Smart Cities

CITIES AROUND THE WORLD ARE PLANNING A REVOLUTION IN THE NEXT 10 YEARS

SMART Buildings: At least 50% of buildings will be Green and Intelligent built with BIPV. Around 20% of the buildings will be Net Zero Buildings.



SMART Infrastructure: Multimodal Transport Hubs Providing Excellent Air, Rail, Road Connectivity to Other Mega Cities



SMART Energy: 20% of Energy Produced in the City will be Renewable (Wind, Solar etc)



SMART Technology: Intelligent Communication Systems Connecting Home, Office, iPhone and Car on a Single Wireless IT Platform



SMART GRID: Infrastructure to Enable Real time monitoring of power flow and Provide Energy Surplus Back to the Grid



Satellite Towns: Main City Centre will Merge with Several Satellite Towns to form ONE BIG MEGA CITY



SMART Cars: At least 10% of Cars will be Electric Vehicles. Free Fast Charging Stations at every half mile



Source: Google images

e-Mobility holds great promise for economic growth

Thank You



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& technology

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the dti

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