

ELECTRIC VEHICLES

Charging Breakthrough

Energy efficient charging of electric vehicles successfully piloted at PE varsity

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After a year of development, a smart grid pilot project for the energy efficient charging of electric vehicles (EVs) through battery storage and energy management across a network of charging stations has proved successful.

Innovated by the uYilo e-Mobility Technology Innovation Programme – a national programme hosted by Nelson Mandela Metropolitan University (NMMU), in Port Elizabeth – the project paves the way for a new era of green transport and smart cities.

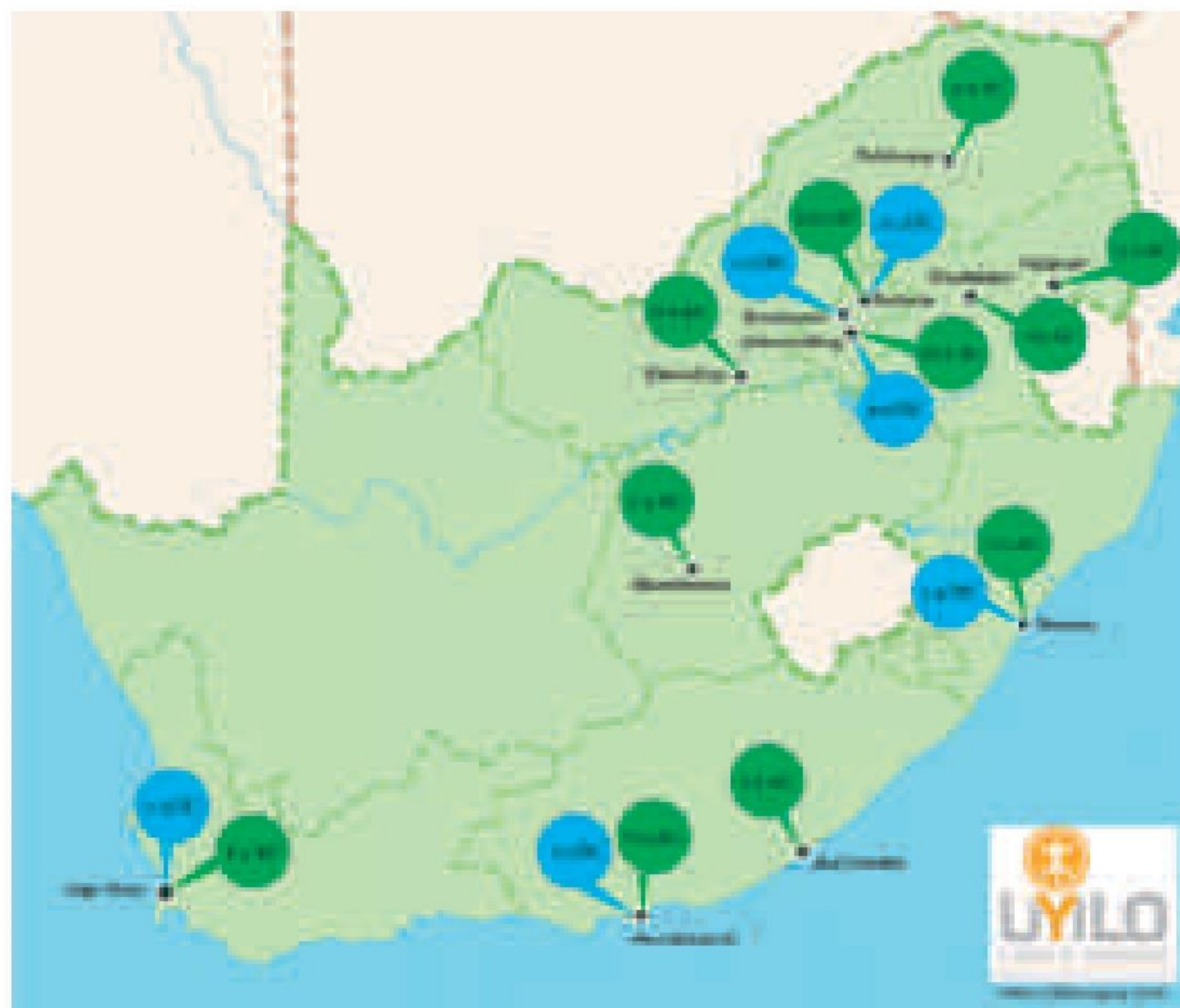
Project leader and uYilo programme deputy director **Hiten Parmar** is pleased with the breakthrough: “Charging EVs with optimised management of renewable energy is a groundbreaking achievement for South Africa and globally. We are not aware of anyone else who has achieved this kind of outcome, incorporating demand management and load levelling.”

The uYilo programme, at NMMU’s innovation hub, eNtsa,

spans a number of faculties and departments at the university, including engineering, information technology and chemistry. With the software the uYilo team has developed, the green future of energy efficient charging of EVs has become a reality.

Further technology advances will include opportunities to be able to transfer power from the EV into the grid or to power people’s homes through a bidirectional charger. The 100% electric Nissan Leaf available in South Africa currently supports this feature of vehicle-to-grid functionality.

What this means is that, instead of the energy utility having to increase infrastructure for EVs, this system considerably reduces the load on the national grid. “Petrol and diesel vehicles are the biggest carbon emitters in the transport sector and the major thrust globally is to use renewable energy as far as possible to ensure that EVs are 100% green, powered by renewable-energy sources, and not fossil-fuel-based, carbon-dioxide-emitting sources of



NATIONAL FOOTPRINT

Electric vehicle charging stations in South Africa

electricity,” says Parmar.

“Within the next five years, we are likely to see strict policies coming into effect around energy efficiency and green transport in South Africa.

“It’s already happening globally. Japan already has more EV charging stations than fuel stations.”

According to a recent study by Japanese vehicle manufacturer Nissan, there are now more than 40 000 charging ports across the country, compared with fewer than 35 000 fuel stations.

“In the UK, EV charging stations will exceed gas stations by 2020, and the Netherlands is planning to ban the sale of petrol and diesel engines from 2025,” Parmar adds.

A recent study by uYilo states that South Africa currently has 98 EV ‘public’ charging stations across the country, including 77 alternating current (ac) slow chargers, which take three to eight hours to charge a battery, and 18 direct current (dc) fast chargers, which take about 20 minutes. Most of the charging stations are located at Nissan and BMW dealerships nationally, but there are also some at Melrose Arch, in Johannesburg, and the V&A Waterfront, in Cape Town.

A locally manufactured public ac charging system costs about R30 000 per charger installed,

while dc charging systems are currently imported and cost about R400 000 per charger installed.

“Through our pilot project, we’ve demonstrated that energy efficiency applied to solar-powered EV stations can be developed at scale because we have solved energy storage through reusing the lithium-ion battery pack from an EV for stationary storage. The energy management system prioritises each charging event, based on renewable and stored energy available, and incorporates a time-of-use feature to manage peak and off-peak charging. In this way, EVs can be sustainably charged 24/7,” says Parmar.

NMMU’s uYilo programme is accredited by the South African National Accreditation System for lead-acid battery testing and will imminently expand on this to become the only facility in South Africa to provide certified lithium-ion battery testing.

Recharging an EV in South Africa currently costs R30 to R40 for every 130 km to 150 km travelled.

The two 100% EVs currently on the South African market are the Nissan Leaf and the BMW i3, both of which can drive for up to 200 km.

The BMW i3 REX can drive



‘GREEN’ INFRASTRUCTURE

The uYilo smart grid ecosystem at Nelson Mandela Metropolitan University, in Port Elizabeth