UYILO
E-MOBILITY PROGRAMME
enabling electro-mobility innovation

Hosted by:
NELSON MANDELA UNIVERSITY

An initiative of:
technology innovation AGENCY

APPLICATION GUIDE – UYILO KICK START FUND

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1. Introduction

The uYilo eMobility Technology Innovation Programme (EMTIP) has been operational since its establishment on 13th March 2013 as initiated by Technology Innovation Agency (TIA) and hosted by the Nelson Mandela University (NMU). The programme serves as a national multi-stakeholder collaborative programme focused on enabling, facilitating and mobilising the electric mobility (eMobility) industry in South Africa. uYilo has been made available to the entire eMobility innovation value chain that includes higher education institutes (HEIs), science councils, small medium micro enterprises (SMMEs), automotive component suppliers, original equipment manufacturers (OEMs), innovators and entrepreneurs.

To support applied research and development activities in the field of eMobility, the uYilo "Kick Start" fund provides an agile mechanism to support strategic projects in the sector, thus accelerating innovation by allowing quick access to funding. The funding is not intended to initiate fundamental or basic research, but are focused on applied research that will accelerate Technology Readiness Levels (TRL) and lead to the creation of products, process or services that can be commercialised to advance the South African eMobility agenda. Industry service delivery and public transport related projects are encouraged.

2. Hurdle criteria:

All successful projects must meet the following three hurdle criteria.

- **Within TIA's Mandate:** The project must fall within TIA's mandate as outlined in the Technology Innovation Agency Act (No. 26 of 2008)
- **Within uYilo's focus**: The project must fall within the strategic focus of uYilo EMTIP, which includes:
  - Energy Storage Technologies;
  - Electric Vehicle Systems;
  - Charging Infrastructure within Smart-Grids;
  - Connected Car
- **Relevance to the industry**: The project must positively contribute to the advancing of the eMobility sector in the country and related applied R&D activities. Therefore projects should:
  - Lead to the creation of eMobility products, processes or services that can be commercialised; or
  - Solve a critical problem that is a barrier to the development of the EV industry; or
  - Show potential for further investment

3. Project adjudication criteria:

Projects submitted will be adjudicated using the following criteria:

- **Stage of Technology Development:** The project must be of an applied research and/or a developmental nature; fundamental or basic research will not be funded. The technology must be at least TRL3 (Technology Readiness Level 3) as defined by the TRL Guidelines provided with the application form. The proposed offering must have passed the initial proof of concept stage. Specific technologies are expected to provide a step change in efficiency, operational cost or improved performance when compared with today's solutions.
- **Technology Viability:** Technical viability of the solution (process, product or service) and/or technology must be established by an expert in the field. External consultants may be used if uYilo does not have the in-house capability to assess the technology.
- **Technology Development:** The project must advance the technology to a stage where it can be further funded, commercialised and/or utilised. There has to be a clear indication of the change in TRL level that is expected during the project. Not advancing the TRL will not disqualify the project, but significant progress must be shown.

- **Team:** The project team must comprise the relevant resources who have the requisite skills/experience to execute the project. Demographics of the team members should be inclusive.
- **Market:** The project proposal must show that there is a reasonable market in terms of volume or price.
- **Project Plan:** The project plan must include focused activities with clear deliverables/outcomes and time lines and at least one deliverable must be a viable proposal/business plan for taking the idea forward.
- **Budget:** The budget should be reasonable for the scope of work to be undertaken and should correlate with the proposed activities. The request for funding should not exceed prescribed limit and co-funding of activities will be considered positively. All other funding received for this project must be declared and projects may be rejected if already funded by TIA or by other government departments and/or agencies. Budget items must fit within the fundable activities which are:
  - Proving technology functionality
  - Prototype development or improvement
  - Production of market samples
  - Refining and implementing designs
  - Support of certification activities
  - Piloting and scale-up and techno-economic evaluation

4. Grant funding limits

Two categories are defined:

1. Individual projects that only have one participant in the project and;
2. Collaborative project that has multiple participants.

Individual projects will be limited to R 500,000 (Five hundred thousand Rand) of funding from the Kick Start Fund. Preference will be given to projects that provide co-funding.

In the case where collaborative projects provide matched co-funding (equal to that of the Kick Start Fund) the limit will be R 1,000,000 (One million Rand). For collaborative projects that do not provide matched co-funding the limit will be R 500,000 (Five hundred thousand rand).

5. Application Process and Timeline

The programme will issue an annual call for proposals; the closing dates for these calls will be published on the uYilo website (www.uYilo.org.za). Calls will include any requirements specific to that call. Applicants must complete a “uYilo Kick Start Fund Application Form”, the latest version of which will be made available on the uYilo website. Completed forms must be returned to the Programme via email to uYilo@mandela.ac.za

Additional contact information:
uYilo eMobility Technology Innovation Programme
Email: uYilo@mandela.ac.za
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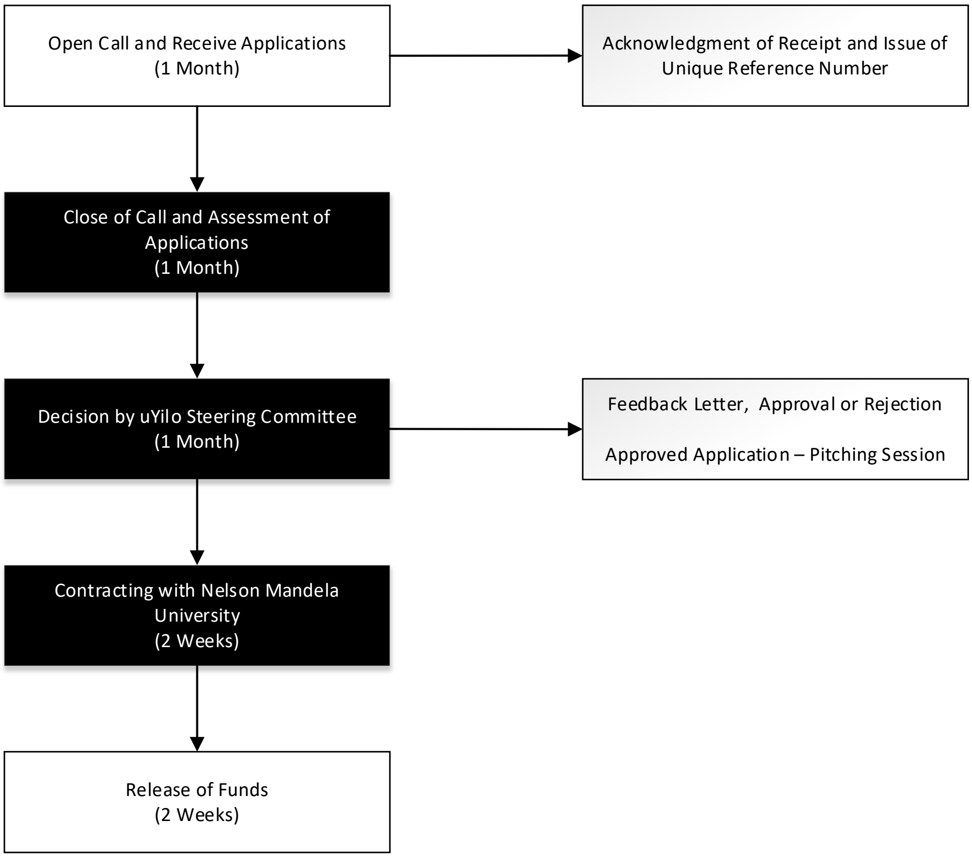
Upon receipt of the application, the applicant will receive acknowledgement in writing and will be provided with unique reference number that can be used to track the application process. Only upon the closing date of the call period will projects be pre-assessed by the uYilo EMTIP team who will recommend appropriate applications for approval to the uYilo EMTIP Steering Committee, which meets every quarter. Shortlisted applicants will be invited to a pitching session that will provide the opportunity to extend the overview of the proposed technology development process that will aid benefit to the South African EV industry.

The uYilo EMTIP Steering Committee will consider **all** applications and approve appropriate projects for funding. The decision of the uYilo EMTIP Steering Committee is final. The outcome of the Steering Committee decision will be communicated to the applicants, in writing. The Steering Committee may request amendments to the project scope and budget. Successful applicants will be required to sign a project delivery agreement with Nelson Mandela University.

A maximum period of 3 (three) months from the close of the call to the receipt of outcome (approved or rejected) of the application can be expected.

The process is summarised in the diagram below.



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TECHNOLOGY READINESS LEVELS (TRLs) GUIDELINES

OVERVIEW - TECHNOLOGY READINESS LEVEL (TRL) DEFINITIONS	
TRL 1	**Basic Research:** Initial scientific research has been conducted. Principles are qualitatively postulated and observed. Focus is on new discovery rather than applications.
TRL 2	**Applied Research:** Initial practical applications are identified. Potential of material or process to solve a problem, satisfy a need, or find application is confirmed.
TRL 3	**Critical Function or Proof of Concept Established:** Applied research advances and early stage development begins. Studies and laboratory measurements validate analytical predictions of separate elements of the technology.
TRL 4	**Lab Testing/Validation of Alpha Prototype Component/Process:** Design, development and lab testing of components/processes. Results provide evidence that performance targets may be attainable based on projected or modeled systems.
TRL 5	**Laboratory Testing of Integrated/Semi-Integrated System:** System Component and/or process validation is achieved in a relevant environment.
TRL 6	**Prototype System Verified:** System/process prototype demonstration in an operational environment (beta prototype system level).
TRL 7	**Integrated Pilot System Demonstrated:** System/process prototype demonstration in an operational environment (integrated pilot system level).
TRL 8	**System Incorporated in Commercial Design:** Actual system/process completed and qualified through test and demonstration (pre-commercial demonstration).
TRL 9	**System Proven and Ready for Full Commercial Deployment:** Actual system proven through successful operations in operating environment, and ready for full commercial deployment.

TRL 1 Definition	**TRL 1 Description**
Basic Research. Initial scientific research begins. Examples include studies on basic material properties. Principles are qualitatively postulated and observed.	Basic principles are observed. Focus is on fundamental understanding of a material or process. Examples might include paper studies of a material's basic properties or experimental work that consists mainly of observations of the physical world. Supporting information includes published research or other references that identify the principles that underlie the material or process. A specific example in PV might be the observation of increased light absorption in silicon nanotubes or observation of multiple exciton generation.
TRL 2 Definition	**TRL 2 Description**
Applied Research. Initial practical applications are identified. Potential of material or process to satisfy a technology need is confirmed.	Once basic principles are observed, practical applications can be identified. Applications are speculative, and there may be no proof or detailed analysis to support the assumptions. Examples are still limited to analytic studies. Supporting information includes publications or other references that outline the application being considered and that provide analysis to support the concept. The step up from TRL 1 to TRL 2 moves the ideas from basic to applied research. Most of the work is analytical or paper studies with the emphasis on understanding the science better. Experimental work is designed to corroborate the basic scientific observations made during TRL 1 work. An example in PV might be analytical models of a new thin film with very low absorption coefficient that could serve as an enhanced anti-reflective coating, or in a multi-layer anti-reflective coating.
TRL 3 Definition	**TRL 3 Description**
Critical Function, i.e., Proof of Concept Established. Applied research continues and early stage development begins. Includes studies and initial	Analytical studies and laboratory-scale studies are designed to physically validate the predictions of separate elements of the technology. Examples include components that are not yet integrated. Supporting information includes results of laboratory tests performed to measure parameters of interest and comparison to analytical predictions for critical components.

laboratory measurements to validate analytical predictions of separate elements of the technology. Examples include research on materials, components, or processes that are not yet integrated.	At TRL 3 experimental work is intended to verify that the concept works as expected. Components of the technology are validated, but there is no strong attempt to integrate the components into a complete system. Modelling and simulation may be used to complement physical experiments. Examples in PV would include deposition of thin films on bare substrates or films for optical measurement of devices and not necessarily actual PV devices.
TRL 4 Definition	**TRL 4 Description**
Laboratory Testing/Validation of Alpha Prototype Component/Process. Design, development and lab testing of technological components are performed. Results provide evidence that applicable component/process performance targets may be attainable based on projected or modelled systems.	The basic technological components are integrated to establish that the pieces will work together. This is relatively "low fidelity" compared with the eventual system. Examples include integration of ad hoc hardware in a laboratory and testing. Supporting information includes the results of the integrated experiments and estimates of how the experimental components and experimental test results differ from the expected system performance goals. TRL 4-6 represent the bridge from scientific research to engineering, from development to demonstration. TRL 4 is the first step in determining whether the individual components will work together as a system. The laboratory system will probably be a mix of on-hand equipment and a few special purpose components that may require special handling, calibration, or alignment to get them to function. An example in PV might include the first attempts to fabricate a new PV device design in the laboratory. The concept is there but the details of the unit process steps are not yet worked out. The goal of TRL 4 should be the narrowing of possible options in the complete system.
TRL 5 Definition	**TRL 5 Description**
Laboratory Testing of Integrated/Semi-Integrated System. Component and/or process validation in relevant environment- (Beta prototype component level).	The basic technological components are integrated so that the system configuration is similar to (matches) the final application in almost all respects. Supporting information includes results from the laboratory scale testing, analysis of the differences between the laboratory and eventual operating system/environment, and analysis of what the experimental results mean for the eventual operating system/environment. The major difference between TRL 4 and 5 is the increase in the fidelity of the system and environment to the actual application. The system tested is almost prototypical. An example in PV might be the fabrication of devices that closely match or exceed the expected efficiency targets but is fabricated in the lab manually with minimal automation. Scientific risk should be retired at the end of TRL 5. Results presented should be statistically relevant.
TRL 6 Definition	**TRL 6 Description**
Prototype System Verified. System/process prototype demonstration in an operational environment- (Beta prototype system level).	Engineering-scale models or prototypes are tested in a relevant environment. This represents a major step up in a technology's demonstrated readiness. Examples include fabrication of the device on an engineering pilot line. Supporting information includes results from the engineering scale testing and analysis of the differences between the engineering scale, prototypical system/environment, and analysis of what the experimental results mean for the eventual operating system/environment. TRL 6 begins true engineering development of the technology as an operational system. The major difference between TRL 5 and 6 is the step up from laboratory scale to engineering scale and the determination of scaling factors that will enable design of the final system. For PV cell or module manufacturing, the system that is referred to is the manufacturing system and not the cell or module. The engineering pilot scale demonstration should be capable of performing all the functions that will be required of a full manufacturing system. The operating environment for the testing should closely represent the actual operating environment.

	Refinement of the cost model is expected at this stage based on new learning from the pilot line. The goal while in TRL 6 is to reduce engineering risk. Results presented should be statistically relevant.
TRL 7 Definition	**TRL 7 Description**
Integrated Pilot System Demonstrated. System/process prototype demonstration in an operational environment- (integrated pilot system level).	This represents a major step up from TRL 6, requiring demonstration of an actual system prototype in a relevant environment. In the case of a new PV module, this will include a full scale pilot line capable of producing such modules. Examples include manufacturing the PV devices on a manufacturing pilot line with operations under primary control of manufacturing. Significant amount of automation is expected at the completion of this phase if the cost model for full scale ramp requires it. 24 hour production (at least for a relevant duration) is expected to discover any unexpected issues that might occur during scale up and ramp. Supporting information includes results from the full-scale testing and analysis of the differences between the test environment, and analysis of what the experimental results mean for the eventual operating system/environment. Final design is virtually complete. The goal of this stage is to retire engineering and manufacturing risk. To credibly achieve this goal and exit TRL 7, scale is required as many significant engineering and manufacturing issues can surface during the transition between TRL 6 and 7.
TRL 8 Definition	**TRL 8 Description**
System Incorporated in Commercial Design. Actual system/process completed and qualified through test and demonstration- (Pre-commercial demonstration).	The technology has been proven to work in its final form and under expected conditions. In almost all cases, this TRL represents the end of true system development. Examples include full scale volume manufacturing of commercial end product. True manufacturing costs will be determined and deltas to models will need to be highlighted and plans developed to address them. Product performance delta to plan needs to be highlighted and plans to close the gap will need to be developed.
TRL 9 Definition	**TRL 9 Description**
System Proven and Ready for Full Commercial Deployment. Actual system proven through successful operations in operating environment, and ready for full commercial deployment.	The technology is in its final form and operated under the full range of operating conditions. Examples include steady state 24/7 manufacturing meeting cost, yield, and output targets. Emphasis shifts toward statistical process control.