

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP¹

WG C6.38	Name of Convenor: Kurt Dedekind (South Africa) E-mail address: Kurt Dedekind <DedekiVK@eskom.co.za>	
Strategic Directions #²: 1, 2, 3		Technical Issues #: 1, 5, 7, 8
The WG applies to distribution networks⁴: Yes		
Potential Benefit of WG work #⁶: 1, 2, 4, 6		
Title of the Group: Rural electrification		
Scope, deliverables and proposed time schedule of the Group: Background: <p>Electric energy is a driver for economic development and growth in rural areas. It is a clean energy resource that can be readily distributed, or produced and consumed locally as required. The recent technological advances in distributed energy resources (DER) and systems, including electric power generation from renewable energy (wind and solar) and electricity storage systems (batteries), have significantly reduced the price of installations and the kWh production cost, particularly for solar power and battery storage. In parallel with the developments in the areas of power generation and storage, significant advances continue to be made in the area of communication and control, enabling a coordinated control and dispatch of DER and loads to ensure a reliable and secure electrical power source. Technological advances allow a clear business case to be made for deploying DER based on local resources in rural and remote settings.</p> Scope: <p>The scope of this working group is to study the contributions that can be made to rural electrification through the deployment of distributed energy resources (DER), supported by modern control and communication systems, for both grid connected and off-grid electric distribution systems. Political, institutional and societal issues are outside the scope of this report. The following topics will be explored and elaborated within the WG.</p> <ol style="list-style-type: none"> 1. Sources of a secure electric energy supply – transmission, distribution and LV grid (if available), local generation resources (small hydro, diesel generators), distributed energy resources (DER), renewable energy resources (solar, wind, small hydro), alternative energy resources (bioenergy, including biogas and biomass), hybrid generation systems. Types and role of energy storage. Standalone systems. 2. Sustainability, emissions and GHG, environmental protection and impact, footprint. Power quality, reliability and availability of the energy supply, energy security (short term and long term). Competing energy resources. 		

3. Ownership, maintenance and operation of distributed energy resources (DER), including generation. Integration, interconnection requirements, grid codes and standards.
4. Rural electrical loads, load identification and forecasting (load and generation capacity and capability), estimation, control, planning and expansion. Applications in agricultural, industrial, mining and commercial settings. Demand response. Energy efficiency. Metering for billing, monitoring and control.
5. Review of practices and approaches in generation and distribution deployment in different jurisdictions, including rural electrification plans.
6. Rural electric distribution system architecture, use cases and tools for energy system planning, design and operation. Forecasting of generation (renewable energy resources) and loads. Modeling. Control. Active distribution systems and microgrids. Creating Building Blocks that will enable Rural Electrification
7. Experiences and examples of deployments. Case studies. Issues include: (a) dealing with topographical and terrain impacts; (b) density / settlement patterns; (c) jurisdiction and administration; (d) cost and affordability.
8. Guidelines and existing practices, techno-economic challenges and present and future solutions.

Deliverables:

- Technical Brochure and Executive summary in Electra
- Electra report
- Tutorial⁵

Time Schedule: start: August 2018**Final Report:** December 2020**Approval by Technical Council Chairman:****Date:** 13/07/2018

Notes: ¹ or Joint Working Group (JWG), ² See attached Table 2, ³ See attached Table 1, ⁴ Delete as appropriate, ⁵ Presentation of the work done by the WG, ⁶ See attached table 3

Table 1: Technical Issues of the TC project "Network of the Future" (cf. Electra 256 June 2011)

1	Active Distribution Networks resulting in bidirectional flows
2	The application of advanced metering and resulting massive need for exchange of information.
3	The growth in the application of HVDC and power electronics at all voltage levels and its impact on power quality, system control, and system security, and standardisation.
4	The need for the development and massive installation of energy storage systems, and the impact this can have on the power system development and operation.
5	New concepts for system operation and control to take account of active customer interactions and different generation types.
6	New concepts for protection to respond to the developing grid and different characteristics of generation.
7	New concepts in planning to take into account increasing environmental constraints, and new technology solutions for active and reactive power flow control.
8	New tools for system technical performance assessment, because of new Customer, Generator and Network characteristics.
9	Increase of right of way capacity and use of overhead, underground and subsea infrastructure, and its consequence on the technical performance and reliability of the network.
10	An increasing need for keeping Stakeholders aware of the technical and commercial consequences and keeping them engaged during the development of the network of the future.

Table 2: Strategic directions of the TC (ref. Electra 249 April 2010)

1	The electrical power system of the future
2	Making the best use of the existing system
3	Focus on the environment and sustainability
4	Preparation of material readable for non-technical audience

Table 3: Potential benefit of work

1	Commercial, business or economic benefit for industry or the community can be identified as a direct result of this work
2	Existing or future high interest in the work from a wide range of stakeholders
3	Work is likely to contribute to new or revised industry standards or with other long term interest for the Electric Power Industry
4	State-of-the-art or innovative solutions or new technical direction
5	Guide or survey related to existing techniques. Or an update on past work or previous Technical Brochures
6	Work likely to have a safety or environmental benefit