

## CIGRE Study Committee B3

### PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP <sup>(1)</sup>

<b>WG N° B3.43</b>	<b>Name of Convenor:</b> Peregrine (Perry) Tonking (AU) <b>E-mail address:</b> peregrine.tonking@gmail.com	
<b>Technical Issues # <sup>(2)</sup>:</b> 1, 3, 5		<b>Strategic Directions # <sup>(3)</sup>:</b> 1, 2, 3
<b>The WG applies to distribution networks <sup>(4)</sup>:</b> Yes		
<b>Title of the Group:</b> Contemporary solutions for low cost substations		
<p><b>Scope, deliverables and proposed time schedule of the Group</b></p> <p><b>Background :</b></p> <p>The United Nations proclaimed 2012 the “International Year of Sustainable Energy for All” and have set 2030 as the target date for universal access to modern energy services, including electricity. In the developed world the provision of a reliable electricity service is taken for granted and significant efforts are made to switch energy production to low carbon options. There are however many parts of the world, mainly in rural and remote areas in the developing countries, where electricity supply is non-existent or unreliable. The major obstacles to electrification of these areas include the low demand, low load intensity, and affordability of the customer base to pay. Low-cost solutions adapted to local circumstances are therefore imperative. Both grid-based and off-grid options are available to provide these areas with electricity.</p> <p>Poor infrastructure is a major obstacle to societal development. Many infrastructure projects are costly and national governments and donor countries are not able to provide enough money. Private participation, both financially and technically, can play a key role as regards large power generation assets. Though there are good investment opportunities many of them are risky and would require an appropriate rate of return. The transmission infrastructure is critical to develop and exploit generation potential.</p> <p>The objective of this Working Group is to identify and discuss opportunities to lower the cost and risk of new substation assets. The working group will establish recommendations and guidance for the design, construction, operation and maintenance of low-cost substations based on currently available equipment. The work will build upon existing documentation as listed in the appendix.</p> <p><b>Scope :</b></p> <p>The activity will focus on the locally and regionally available resources and the capability to develop sustainable solutions appropriate for the region. Specifically, the working group will:</p> <ol style="list-style-type: none"> <li>1. Seek engagement from organisations operating in the target regions with specialist expertise in deploying electricity substation infrastructure.</li> <li>2. Conduct a survey of practices around the world for relevant high voltage and medium voltage installations.</li> <li>3. Identify and assess currently available technologies for a range of low cost substations.</li> <li>4. Consider the balance of plant impact (auxiliary systems, communications etc.) necessary to support a sustainable low cost operation.</li> <li>5. Consider lifetime challenges and mechanisms to evaluate whole life value since quoting actual costs in this report will be impractical.</li> <li>6. Provide sufficient guidance to deliver practical solutions.</li> <li>7. Consider CIGRE’s role in support of the development of local expertise and skills.</li> <li>8. Contribute to the development of relevant global technical standards.</li> </ol> <p><b>Deliverables :</b></p> <p>Technical brochure, summary in Electra and other publications, Tutorial</p>		

**Time Schedule:** start: October 2015

**Final report:** Late 2018

**Comments from Chairmen of SCs concerned :**

**Approval by Technical Committee Chairman :**

**Date :** 26/07/2015



<sup>(1)</sup> or Joint Working Group (JWG) - <sup>(2)</sup> See attached table 1 – <sup>(3)</sup> See attached table 2  
(4) Delete as appropriate

## Relevant literature

- "Planning issues for newly industrialized and developing countries (Africa)"; CIGRE Brochure 547.
- "African electricity infrastructure interconnections and electricity exchanges" (Hammons, T.J, et al; IEEE Transactions, Vol 15, Issue 4).
- "Financing Africa's Infrastructure Gap", [www.brookings.edu/blogs/up-front/posts/2013/10/09-financing...](http://www.brookings.edu/blogs/up-front/posts/2013/10/09-financing...)
- "Electrical Power in Africa: Challenges and Opportunities", Krogh, B.H et al, IEEE Smart Grid, December 2012.
- "Towards Universal Energy Access by 2030", Bazilian, M, NREL, Febr 2013.
- Design Guide for Rural Substations" (United States Department for Agriculture: [www.rurdev.usda.gov/supportdocuments/uep\\_bulletin\\_1724e-300.pdf](http://www.rurdev.usda.gov/supportdocuments/uep_bulletin_1724e-300.pdf))
- "Guides for Electric Cooperative Development and Rural Electrification" (NRECA International, [www.nreca.coop/wp-content/uploads/2013/07/GuidesforDevelopment.pdf](http://www.nreca.coop/wp-content/uploads/2013/07/GuidesforDevelopment.pdf)).

**Table 1: Technical Issues from Study Committee B3 (cf. Strategic Plan 2005-20014. Rev 11/2009)**

1	New optimised substation concepts
2	Increased substation functionality (primary, secondary, auxiliaries)
3	New concepts for substation operation and maintenance
4	New improvements for existing substations (retrofit, uprating, upgrading, renewal)
5	Increased substation operational efficiency
6	Increased environmental compatibility and reduced emissions
7	Design adaptation of secondary systems.

**Table 2: Strategic directions of the Study Committee B3 (cf. Strategic Plan 2005-20014. Rev 11/2009)**

1	New substation concepts: Development of new concepts including bus arrangements, hybrid solutions, new applications and functions including specification of corresponding design/layout criteria for substations constituting integral parts of totally optimised networks
2	Substation management issues: Organisational aspects including human resource and training needs, in-service support, software management including quality control and maintenance. Asset management including technical, financial and regulatory requirements.
3	Life cycle management and maintenance: Monitoring in-service experience including digital and sophisticated measuring equipment, substation condition assessment, aspects of maintenance outsourcing, short-and long-term needs, opportunities for cost reduction, spare parts. Increased utilisation (life extension, upgrading, dynamic loading), refurbishment / renovation concepts, investment strategies, principles for combining existing and new equipment - taking into account specific demands from network-reliability and customer demand-side points of view.
4	Impact of new communication standards and Smart Grids on existing and new substations: New technologies to be used in substations, impact of distributed generation and power flow control systems, increased use of advanced information and communication technologies under HV conditions.