

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

<p>WG* N° B2.61</p>	<p>Name of Convenor : <b>Árni Björn Jónasson (Iceland)</b>  E-mail address: <a href="mailto:arni@araengineering.is">arni@araengineering.is</a></p>
<p>Technical Issues # (2): (9)</p>	<p>Strategic Directions # (3): (1) and (3)</p>
<p>The WG applies to distribution networks: <b>Yes</b></p>	
<p><b>Title of the Group: Transmission Line Structures with Fiber Reinforced Polymer (FRP) Composites</b></p>	
<p><b>Scope, deliverables and proposed time schedule of the Group :</b></p> <p><b>Background :</b></p> <p>Traditional materials worked well for a long time for transmission lines. However, the emerging new FRP materials show great benefits for the electrical utility industry addressing many of the challenges utilities currently face. Some of them have considerable durability, environmental friendliness, timely structure delivery and good quality material availability.</p> <p>In the last years FRP has become more and more common in various industrial applications in the aerospace, military, shipping, car, civil engineering and sportsgear industries. In many areas FRP replace traditional materials where FRP properties provide a more suitable and cost effective solution for certain applications.</p> <p>There are manufacturers using Glass Fibre Reinforced Polymer composites as construction material for new transmission line poles, cross arms, cross bracings and other structural components. Other fiber reinforcements for example carbon fiber, aramid (Kevlar) and basalt fiber are also being considered.</p> <p><b>Scope :</b></p> <ol style="list-style-type: none"> <li>1. Prepare a questionnaire to determine the current use of Fibre Reinforced Polymer structures at various voltage levels, conductor and circuit configurations in the transmission line industry. The questionnaire would ask the various type of fibers, resins and ultra violet inhibitor systems in place. (UV damage is the major cause of FRP degradation). Also for existing installations, reasons for selecting FRP structures, successes, challenges and operational experiences. Based on the answers the WG shall prepare a report on FRP in HV-structure design use, to clarify to what extent it is in use, service experience and the research and developing being in progress.</li> <li>2. The WG shall discuss the technological design parameters, specific design considerations (for example serviceability criteria) and best design practices using FRP materials for transmission lines.</li> <li>3. A description and discussion on material suitability and durability, fabrication methods and material strength properties for FRP to be used high voltage structures will be provided.</li> <li>4 The WG should also provide information on the advantages and challenges with FRP HV-supports and structures in their life span, design, manufacturing, construction, operation, maintenance, decommissioning and disposal. All of these in the overall life cycle activity and</li> </ol>	

cost analysis perspective.

5. From the above the WG will present recommendations for use of FRP at various voltage levels, cost effectiveness in relation to line length, number of conductors and circuits, right of way (ROW) requirements and environmental friendliness and will compare all of these to other traditional (wood, steel and concrete) materials from the transmission line planning, construction, operation, decommissioning and overall life cycle cost points of view.

**Deliverables:** TB and related report published in Electra.

State-of-the-art document of FRP for High Voltage Transmission Lines. The brochure will include a detailed glossary, reference and list of relevant standards providing good knowledge on the current experience with FRP transmission line structures. A comprehensive picture gallery of FRP HV structures will be also included in the document.

A tutorial based on the WG activities will be prepared, delivered and shared with CIGRE members with the purpose of adaptation of FRP technology for electrical utilities benefiting their activities.

**Deliverables :** TB and related Electra paper

**Time Schedule :** Start : October 2015

**Final report :** December 2018

**Comments from Chairmen of SCs concerned :**

**Approval by Technical Committee Chairman :**

**Date :** 29/03/2015



- (1) Joint Working Group (JWG) - (2) See attached table 1 – (3) See attached table 2  
(4) Delete as appropriate

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

<b>1</b>	Active Distribution Networks resulting in bidirectional flows within distribution level and to the upstream network.
<b>2</b>	The application of advanced metering and resulting massive need for exchange of information.
<b>3</b>	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.
<b>4</b>	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.
<b>5</b>	New concepts for system operation and control to take account of active customer interactions and different generation types.
<b>6</b>	New concepts for protection to respond to the developing grid and different characteristics of generation.
<b>7</b>	New concepts in planning to take into account increasing environmental constraints, and new technology solutions for active and reactive power flow control.
<b>8</b>	New tools for system technical performance assessment, because of new Customer, Generator and Network characteristics.
<b>9</b>	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.
<b>10</b>	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 (cf. Electra 249 April 2010)**

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