

**CIGRE Study Committee B5**

**PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP**

<b>WG 1<sup>o</sup> B5.76</b>	<b>Name of Convenor:</b> Alex Roumpies (CH) <b>E-mail address:</b> Alex.Roumpies@landisgyr.com	
<b>Strategic Directions #<sup>2</sup>:</b> 1, 2		<b>Sustainable Development Goal #<sup>3</sup>:</b> 9
<b>The WG applies to distribution networks:</b> <input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No		
<b>Potential Benefit of WG work #<sup>4</sup>:</b> 1, 2, 3, 4, 5		
<b>Title of the Group:</b> Architecture, Standards and Specification for metering system in a Digital Substation and Protection, Automation and Control (PACS) Environment		
<b>Scope, deliverables and proposed time schedule of the WG:</b>		
<b>Background:</b>		
<p>WG B5.41 Improved Metering Systems for Billing Purposes in Substations that worked between 2010-2019 released its Technical Brochure <b>TB 789</b> in 2020. The work of this group has shown that adoption or approval of the use of new technologies tends to be slow for substation metering systems and identified some actions as below to be addressed:</p> <ul style="list-style-type: none"> <li>• Manufacturers of metering equipment need to ensure that products are up to date so that they can be selected for approval or use. This is particularly in relation to IEC 61850-9-2 sampled values – at the time of preparing the brochure, very few meters capable of accepting sampled value inputs were available in the marketplace. Not only does this not assist with the promotion of the technologies, it has been shown to be hampering adoption of digital substation techniques due to a reduction in the potential overall benefits.</li> <li>• Regulatory bodies need to have the new technologies demonstrated to them and explained in order to prove the benefits whilst also allaying any concerns regarding accuracy, security of data etc. so that the products above can be applied.</li> <li>• Another aspect to be considered for the future is the new type of professional that the market requires; it is important that they can adapt quickly to acquire new knowledge of various digital technologies now found in substations, including considering the aspects of knowledge communication and information security.</li> </ul> <p>Based on the summary it identified the following areas to be considered for a future working group to address comprehensively:</p> <ul style="list-style-type: none"> <li>• The increasing introduction of the concept Smart Grid offers an opportunity to discuss about metering systems mainly associated with networks automation process and substations.</li> <li>• The integration of revenue metering and power quality functions and the increased volume of data that these devices generate. This data must be managed whilst also observing security and legal requirements.</li> <li>• Consideration of metering in modern power systems with renewable generation and storage (metering and control). With the increasing integration of renewable sources and energy storage systems, the operation of networks will be significantly impacted, and energy measurement issues will be essential to guarantee the operational control of utilities. It will be necessary to approach and propose technical requirements for equipment and associated communication systems, suitable for the measurement and operational control, billing and application of the Auctions and Power Certificates, Quotas, Net-Metering and Feed-in Fee modalities.</li> <li>• The accuracy requirements for digitally interfaced meters also have to consider the accuracy of the associated Merging Units. For this reason, analysis of the accuracy requirements of the complete acquisition chain is necessary. The treatment in the meter is exclusively digital and it should be possible to significantly limit its contribution to the overall error of the functional metering chain.</li> </ul>		

## Scope:

With the deployment of digitally interface revenue metering based on IEC 61850-9-2, there is an emerging need to investigate, clarify and identify technical issues, approval/certification process, business/regulatory drivers and deployment experiences across various countries which has started on this journey and others that are closely looking for some considered and non-biased opinion.

## The aim of the WG is to:

- Investigate architectures for the integration of metering systems into a digital Protection, Automation and Control systems (PACs). This includes both newer systems and retrofit to existing mechanisms
- Investigation to include all metering systems, including tariff / demand metering
- Settlement (Tariff/Revenue) Metering and Operational Metering
- Utilization of IEC 61850 for Digital Metering Assets
- Metering Systems of the Future – 5 to 10 year roadmap
- Provide guidance and recommendation on current standards and practices and improvement actions in this area.
- Assessing all factors to be considered while implementing IEC 61850-9-2 based Revenue Metering like:
  - Merging Unit requirements
  - Metering function Intelligent Electronic Device (IED) requirements
  - Functionality implementation
  - Source Merging Units (MU) selection schemes etc.
  - Time synchronization for sampling
  - Analysis of the accuracy of the functional metering chain including, Instrument Transformers, Merging Units and Digital Meter. Consideration of relative accuracy requirements between different analog acquisition channels
- Process bus primary interface unit options for Current / Voltage / Power digital acquisition: review of current standards (in particular IEC 61869-6 and -9) and practices, definition of acquisition, filtering and transmission characteristics
- Emerging Technology/Technical Aspects associated with IEC 61850 maturity
- Guide for reliability calculation, latency, bandwidth, redundancy and specification for PACS functions, equipment and architecture
- Proposal of requirements for the different components of the acquisition chain and their justification; Methods of calculation; User and manufacturers feedback
- Low power-factor measurement
- Acquisition, concentration, transmission and analytics of primary and PACS condition monitoring data
- Investigation into metering tools, data management, adoption of cloud for revenue metering and power quality values.
- Investigate monitoring and diagnostic, such as traffic anomaly detection.
- Installation, Testing & Commissioning recommendations

- Environmental standards and requirements
- Provide guidance and recommendation on Cyber Security challenges, if any with the substation metering systems, and mitigation actions thereof.
- Functional Integration of PACS with Metering
- Next steps for fully integrated PACS and Metering System – challenges and recommendations.
  - User Benefits from the technology
  - Return on Experience
  - Challenges facing the implementation of the technology.

Possible liaison or representative member from SC D2 will be evaluated.

**Deliverables:**

- Technical Brochure and Executive Summary in Electra
- Electra Report
- Future Connections
- CSE
- Tutorial
- Webinar

**Time Schedule:** start: 03/2021

**Final Report:** Month 02/2024

**Approval by Technical Council Chairman:**



**Date:** March 2nd, 2021

Notes: <sup>1</sup> Working Group (WG) or Joint WG (JWG), <sup>2</sup> See attached Table 1, <sup>3</sup> See attached Table 2 and CIGRE reference Paper: Sustainability – at the heart of CIGRE's work. <sup>4</sup> See attached Table 3

**Table 1: Strategic directions of the Technical Council**

1	The electrical power system of the future reinforcing the End-to-End nature of CIGRE: respond to speed of changes in the industry by preparing and disseminating state-of-the-art technological advances
2	Making the best use of the existing systems
3	Focus on the environment and sustainability (in case the WG shows a direct contribution to at least one SDG)
4	Preparation of material readable for non-technical audience

**Table 2: Environmental requirements and sustainable development goals**

	CIGRE selected the 7 SDGs that are the most relevant to CIGRE. In case the WG work refers to other SDGs or do not address any specific SDG, it will be quoted 0.
0	Other SDGs or not applied
7	<b>SDG 7: Affordable and clean energy</b> Increase share of renewable energy; e.g. expand infrastructure for supplying sustainable energy services; ensure universal access to affordable, reliable, and modern energy services; energy efficiency; facilitate access to clean energy research and technology
9	<b>SDG 9: Industry, innovation and infrastructure</b> Facilitate sustainable infrastructure development; facilitate technological and technical support
11	<b>SDG 11: Sustainable cities and communities</b> Increase attention on sustainable and resilient buildings utilizing local (raw) materials, power for electric vehicles, strengthening long-line transmission and distribution systems to import necessary power to cities, developing micro-grids to reinforce the sustainable nature of cities; protect and safeguard the world's cultural and natural heritage; reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and waste management
12	<b>SDG 12: Responsible consumption and production</b> E.g. Promote public procurement practices that are sustainable; address reducing use of SF6 and promote alternatives, encourage companies to adopt sustainable practices and to integrate sustainability information into their reporting cycle, address inefficient fossil-fuel subsidies that encourage wasteful consumption
13	<b>SDG 13: Climate action</b> E.g. Increase share of renewable or other CO <sub>2</sub> -free energy; energy efficiency; expand infrastructure for supplying sustainable energy; strengthen resilience and adaptive capacity to climate-related hazards and natural disasters; integrate climate change measures into national policies, strategies and planning; improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
14	<b>SDG 14: Life below water</b> E.g. Effects of offshore windfarms; effects of submarine cables on sea-life
15	<b>SDG 15: Life on land</b> E.g. Attention for vegetation management; bird collisions; integration of substations and lines into the landscape

**Table 3: Potential benefit of work**

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