Paris Session 2022

Identifying New PACS Requirements for Multi-energy resource integration

SC B5 PS2 Question 2.04: Application of Emerging Technology for PACS

Q2.04 What is the biggest challenge in the development of the power system considering the multi-type of energy sources and how can it be solved in your opinion?

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Identifying New PACS Requirements for Multi-energy resource integration

- This contribution based on recently established CIGRE working group B5.78
- This special report question 2.04 is a "Trillion" dollar question in my opinion
- World is undergoing "deeper-electrification" across its economy.
- Electricity ('Electron') as the dominant energy vector for next 3 decades has now been baked into every nations' policy. (end-to-end renewable energy grid)
- We need to identify how to help accelerate this from where PACs is currently, through to the transition phase (accelerating) and the end-state of 100% renewable system.

Group Discussion Meeting

CIGRE Study Committee B5

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG [1]N° B5.78	**Name of Convenor:** Nirmal Nair **E-mail address**: n.nair@auckland.ac.nz
Strategic Directions #[2]: 1, 2, 3	**Sustainable Development Goal #[3]: 7 and 13**
The WG applies to distribution networks: ☒ Yes / ☐ No	
Potential Benefit of WG work #[4]: 1, 2, 3, 4, 5	
Title of the Group: New requirements of network protection and control for renewable energy integration	

Scope, deliverables and proposed time schedule of the WG:

Background:

CIGRE B5 and other study committees have in recent years completed or undertaking working group activities with regards to understanding impacts due to larger integration of renewable energy plants to existing predominantly synchronous generation powered power system transmission and distribution grids.

- TB 421 (The impact of renewable energy sources and DG on Substation Protection and Automation)
- TB 629 (Coordination of protection and automation for future networks)
- TB 851 Impact of High Penetration of Inverter-based Generation on System Inertia of networks
- WG B5-48: Protection for developing network with limited fault current capability of generation
- WG B5/C4.61 - Impact of Low Inertia Network on Protection and Control
- WG B5.65 - Enhancing Protection System Support by Response of Inverter-based Sources

There is a need to review the existing codes of practices, identify distinguishable Protection, Automation and Control System (PACS) boundaries to ensure selectivity and effective coordination for networks across the world. Hence this working group has been constituted to collate and report timely on the emerging new network protection and automation requirements

Scope:

1. Review of existing codes of practices and standards for PACS from the CIGRE technical brochures and working groups identified in the background.
2. A synthesizing document that addresses the following items that is not addressed/solved by the existing review of existing documents from (1) will need to be identified and developed in this working group under "End-to-End renewable power system network protection coordination"
   - i. Developing PACS boundaries (HV, MV, LV) for effective protection selectivity, sensitivity and reliability
   - ii. Any new control strategy for DER inverter to make traditional principle more adequate for relay protection. Any new control strategy for DER inverter shall attempt to allow traditional protection principles to work reasonably well
   - iii. Fast protection adaptively coordinated with fault ride-through requirements
   - iv. New methods and technologies for anti-islanding protection and intentional islanding
   - v. PACS schemes enabled by latest communication technologies
   - vi. Control functions on the integrated network
   - vii. Automation strategy for secure end-to-end renewable integrated grid