Abstracts by Stream Session

Monday 2nd November
Session 1: 11:00 - 12:30 (GMT)

A1: Energy Systems

Khalif Ali - Glasgow Caledonian University

Developing a Framework for Underground Cable Fault-Finding in Low Voltage Distribution Networks

This work presents a practitioner's guide for fault-finding in cables within the LV distribution network. The fault-finding procedure was assessed through literature and site visits, which revealed the lack of a designated LV fault-finding process based on a structured protocol. Hence, a framework was developed to create a methodical approach.

Ioannis Antonopoulos - Heriot-Watt University

Artificial Intelligence Approaches for Demand Response

Recent years have seen an increasing interest in Demand Response (DR) as a means to provide flexibility, and hence improve the reliability of energy systems in a cost-effective way. Yet, the high complexity of the tasks associated with DR, combined with their use of large-scale data and the frequent need for near real-time decisions, means that Artificial Intelligence (AI) have recently emerged as key technologies for enabling demand-side response. Data-driven AI techniques used in DR range from machine learning, to artificial neural networks, nature-inspired AI techniques, and multi-agent systems. AI methods can be used to tackle various challenges in DR, ranging from selecting the optimal set of consumers to respond, learning their attributes and preferences, dynamic pricing, scheduling and control of devices, learning how to incentivise participants in the DR schemes and how to reward them in a fair and economically-efficient way.

Arshad Syed Anwar - Glasgow Caledonian University

Strategic Assessment of the Technical and Economic impacts on Investment Decisions of Electric Grid Transmission Systems (STRESS-IT)

This is an analytical research project that aims to explore the impact of different parameters of the electric grid components on the probability of failure, consequence of failure and overall network risk. This research project aims is to (a) provide SPEN with insight into the impact of the asset management decision process, defined by the monetised risk model and (b) inform future investment strategies which may be introduced as a requirement for the next round of price control - RIIO-3. The project will build a simulation model of SPENs lead assets, and the impact of decisions on refurbishment, repair and replacement on the overall whole life costs and benefits. The research will consist of Develop software like CBRM, Lead asset prediction models, Financial Impacts, Defining the metric and scenario evaluation. Sensitivity analysis is performed along with analytical analysis to see the effect of each parameters on the health of transfomer.

Rowland Fraser - University of the Highlands & Islands

A Multi-disciplinary Approach to Cable Optimisation

A computational method for optimal cable routing is being developed for off-shore wind. The method will be directly applicable to WEC arrays and may be expanded to other fields. The method combines multiple constraints by means of a 2D map incorporating geological, environmental, social and economic data. It determines the optimimum cable route with respect to multiple costs. By altering the weighting of these factors a number of optimal designs can be computed to allow assesment of trade-offs and sensitivity analysis. An extrapolation of this technique is shown in Figure 1 which uses a spatial mesh with local optimisers which are combined using a global optimisation process

Agatha Williams-Kelly - University of Edinburgh

Virtual Synchronous Machine Functionality in Voltage Source Converter: Control & Design Requirements

The reduction in inertia is forcing grid operators to request frequency support a must-have service. Voltage Sourced Converters (VSCs) will soon be contracted to participate. This will require the use energy storage and updated controllers. This project is looking at suitable control and design schemes for existing and future VSCs.

B1: Offshore Energy

Marius-Liviu Balan - University of Strathclyde

Performing Heavy Lift Operations from Floating Vessels for Offshore Wind

As offshore wind farms become larger and further from the shore, their maintenance has significant climatic and economic impact. To answer this challenge, one solution isto perform the heavy equipment transfer via floating vessels, whichdepends on multipledegree-of-freedom(DoF)high performance controlof the handling mechanism.

Seda Canbulat - University of Strathclyde

Wind Energy Curtailment Utilisation with a storage technology: Applying Cost-Benefit Base Analysis in Scottish Windfarms

Growing concern about global warming has been revealing its impact gradually over the last decade. Excessive use of fossil fuels has been shown as one of the most significant reason of the global warming. As a mitigation measure, deployment of renewable energy resources is appeared to be an essential energy option. In the last decade, the world witnessed the considerable deployement of the renewable energy resources to meet energy need and wind energy has a vital role within this change. However, as the use of renewable energy sources grows up, coming across some challenges having an impact on the supply and demand balance is inevitable. As the wind energy is non-dispatchable resource, minimizing wind energy curtailment is an important part to harness wind energy efficiently. Deployment of storage technologies for wind energy with supporting policies could help to use wind energy wisely.