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Abstract

Title: DC Microgrids for a Greener and More Efficient Future: A Review of Current Research Trends

A significant paradigm shift is emerging within electrical distribution networks. Although these grids have historically relied on AC (alternating current) transmission, recent technological advances have positioned DC (direct current) distribution as a promising and viable alternative. Today, we are seeing a massive increase in DC equipment, including renewable energy sources and storage systems. As a result, DC networks have become critical for the quick and seamless integration of this technology into existing electrical grids. However, the development of these networks is not driven solely by the number of new DC devices. Compared to traditional AC transmission systems, DC networks are more efficient and reliable, and they avoid issues with reactive power and frequency control. Despite these advantages and extensive research, standardization has yet to be established for several technical aspects. This uncertainty remains an obstacle to a faster transition to DC systems. Furthermore, more research is needed to make this technology a viable daily solution and to fully explore its many potential applications. Finally, there are significant opportunities to apply these DC microgrids across various sectors, but many remain unaddressed. All of these aspects represent critical challenges that must be addressed. This talk will provide an overview of existing and potential solutions for this type of microgrid. Furthermore, it will focus on the obstacles that still need to be faced. These include not only technical aspects but also those related to the required legislation.