Open-Source Active Distribution Grid Model with a Large Share of RES- Features, and Studies

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Open-Source Active Distribution Grid Model with a Large Share of RES- Features, and Studies

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Abstract:

Future distribution grids are likely to shift away from a passive grid consuming power to an active grid with a high share of weather-dependent renewable generation. Distribution grid operations are greatly interlinked between different voltage levels and depend upon the fluctuating load demand. Thus it is imperative to study and analyze multivoltage level distribution grids to understand the challenges and opportunities in a distribution grid with a high share of weather-dependent generation. In this research, an open-source multivoltage level distribution grid model, named the DTU 7k-Bus Active Distribution Grid Model, is presented. The distribution grid model spans across three voltage levels and is modeled on geographical data for network topologies. The generation and load time-series provided with the model are simulated from weather data and derived from measurement data respectively. This work addresses key features of the model and highlights challenges due to the high share of renewables.

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Evolution of Integrated Multi-Energy Vector System and Innovation Opportunities

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Abstract:

Increasing energy demands and visibly changing climatic conditions have led to various deliberations to look at and mitigate the effects causing this adversity. The Paris agreement received greater attention from major countries aiming to decarbonize energy systems and adopt more Renewable Energy Sources (RES). In this regard, India is already ahead of its ambitious targets in increasing its RES installation capacity. However, given the nature of these RES, it has increased the challenges in power systems and questioned the prime component of energy trilemma which is the security of supply. These challenges need to be addressed to avoid failures; one way is to exploit the various synergies between different energy systems. This can reduce carbon emission and increase the renewable penetration in the energy system and meet the requirements of the changing energy sector. This can be facilitated using Multi Energy Systems (MES). These systems optimally interact with each other at different levels and can increase the overall technical, economic, and environmental performance relative to existing energy systems which are planned and operated independently or separately. This paper discusses the overview of MES concepts, key components,