Novel framework for assessing the utilization efficiency of mobile power sources in the power grid

CHINA, November 27, 2023 /EINPresswire.com/ -- Deploying mobile power sources can effectively mitigate the impact of natural disasters on the power grid. However, the investment in emergency resources has marginal effects on enhancing the power grid's survivability. A novel theoretical framework is proposed to evaluate the utilization efficiency of mobile power sources.

Natural disasters are occurring more frequently, causing damage to the power grid and leading to widespread and prolonged power outages. Leveraging mobile power sources has shown potential in lessening the impact of these disasters; however, their efficiency remains largely unassessed.

An article published in the Journal of Economy and Technology proposed, for the first time, a theoretical framework for evaluating the utilization efficiency of mobile power sources. The study emphasizes that deploying mobile power sources not only affects the grid's structure but also impacts the survival of critical facilities.

“Mobile power sources generate electricity through vehicle-mounted generators and connect to the power grid to provide reliable emergency power to critical facilities such as hospitals,” explained corresponding author of the study, Yunhe Hou, an associate professor at the Department of Electrical and Electronic Engineering, The University of Hong Kong. “Therefore, as an essential disaster prevention measure, investing in mobile emergency power sources is particularly important for improving the power grid's survivability and rapid recovery capability during disasters.”

The flip side is, impractical deployment strategies for mobile power sources might result in inadequate safeguarding of the power supply to critical facilities following disasters. This can result in economic losses and resource waste and, in extreme cases, even disrupt power grids.

“Hence, we need to use limited mobile power sources to develop reasonable and effective deployment strategies in a short period before disasters occur to cope with all potential threats,” added Hou.

Notably, the study considered all possible failure scenarios when disasters strike the power grid,

including the number of failed components and the location of the failure occurrence. “The traditional approach of considering only typical scenarios has become increasingly ineffective,” Hou said.

The team also emphasized that the power grid's inherent structure plays an important role in its capacity to endure extreme weather conditions and defined this effect as the structural resilience of the power grid.

The team believes that the proposed theoretical framework technology will help power grids against extreme weather, optimize resource utilization, and realize economic and social benefits.

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