

Abstract

24th IERE General Meeting and PLN Indonesia Forum
November 19–22, 2024

Mobile Micro-Energy Station and Its Flexible System

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Keywords:

Multi-energy, Energy management, Emergency power supply, AC/DC networking

Abstract:

[Background]

Scenarios such as disaster prevention and mitigation, rapid emergency response, temporary power supply for special needs, and power supply assurance for major events have raised demands for rapid response, flexible power supply, and stable and enduring power supply in the new power distribution system.

[Pain points]

Traditional emergency power sources, represented by diesel generators and energy storage battery vehicles, have several shortcomings. Firstly, they rely on a single energy source with insufficient durability and high economic cost. Secondly, they exhibit poor response speed, load-carrying capacity, stability, and flexibility. Thirdly, they generate significant noise and emissions.

[How we address]

To address these issues, our project, firstly, utilizes multi-form energy sources in separate compartments as basic independent power supply modules. Secondly, it forms an energy system through AC-DC interconnection. Finally, these compartments are mounted on carriers to achieve mobile "networking" applications.

[Introduction & Characteristics]

Mobile Micro-energy Station is oriented to multi-scenario emergency power supply and temporary power supply needs, constructing an AC/DC hybrid energy security system with electric energy conversion as the core, and the integration of photovoltaic-hydrogen-storage-diesel energy, realizing flexible access, rapid recovery and network operation of the power supply, energy storage, and AC/DC loads.

1) The equipment is highly integrated and modularized, with photovoltaic power generation, hydrogen fuel cells, new types of energy storage, diesel power generation, a total of four types of power forms, each power module has the function of independent power supply and DC load networking, applicable to emergency power supply in unexpected situations, post-disaster reconstruction, power supply protection for important activities, temporary camps, capacity expansion of charging power station, and other scenarios;

2) The equipment integrates satellite + 5G communication function, which can play various roles, such as emergency communication base station, remote video command center, mobile monitoring of extreme disaster site, so that it is suitable for post-disaster production and life restoration construction, communication enhancement of important activities, and other scenarios;

3) With the energy management system embedded, the equipment applies flexible power conversion module and adaptive power interface, with multi-port, multi-power plug-and-play access capability, which supports the expansion of traditional emergency power supply, such

as diesel generation and other multi-machine expansion in parallel, and it can realize millisecond seamless switching onto/off the grid.