

Mobile Fuel Cell Generators - Sustainable Power for Emergency Backup and Off-Grid Commercial Applications

The Issue

With efficiency improvements and cost reductions in renewable generation and the development of more energy-dense storage technologies, primarily for electric vehicles, it is now possible to create a clean energy mobile backup system. Some technologies are currently coming on the market to provide services such as providing power for charging phones or other electronic devices, usually in a public space, such as a campus, or to provide vehicle charging in remote locations. However, they have not been demonstrated in environments requiring greater capacity and reliability, such as during grid outages in emergency response. The lack of data on performance of these systems during critical needs, such as in power outages, is impeding their broader deployment.

Project Innovation + Advantages

The Mobile Fuel Cell Generator (MFCG) project will result in development and demonstration of a transportable generator that uses renewable energy to meet fossil fuel and greenhouse gas mitigation goals. The project will deliver two prototype MFCG systems, each designed to supply an average of 35 kilowatts (kW) of power continuously for 48 hours. The principal power supply will be a fuel cell rated at 80 kW, fueled with hydrogen stored as a compressed gas in high-pressure (350 bar) cylindrical tanks. A battery pack will provide energy to start the system and to augment the fuel cell for brief power surges. The entire system will be installed on a custom trailer with an enclosure to maintain proper temperature, humidity, and other environmental conditions. One trailer-mounted system will be demonstrated in San Diego County and the other will be demonstrated at multiple locations in the Greater Los Angeles region. MFCG variants, using a modular design approach will support numerous commercial applications.

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Climate change is increasing the frequency of power outages and creating an urgent need for sustainable backup power solutions.

BENEFITS

This project will demonstrate a novel mobile generator concept combining hydrogen fuel cells with lithium-ion batteries to produce electricity for sustained periods with zero emissions and reduced noise, as compared with conventional fossil fuel-powered generators. This approach can meet backup power needs during wildfires and other local emergencies, deliver sustainable power for remote, off-grid communities to help achieve more equitable energy outcomes, and improve resiliency by providing a new, highly flexible and transportable distributed energy resource.

Public Safety: The MFCG will deliver backup power during wildfires and other emergencies, recharging cell phones and other critical devices and sustaining the operation of critical facilities such as hospitals and service stations.

Lower Costs: As hydrogen fuel costs decline, the MFCG can approach the total cost of ownership (TCO) of diesel generators and operate for less than half the TCO of a battery-based generator. Smaller variants of the MFCG will be capable of meeting shorter duration needs at an even lower cost.

Environment Benefits: Each MFCG system is projected to reduce GHG emissions by ~31 tons per year while eliminating the use of diesel generators for backup and portable power.

Energy Security: The MFCG will ensure energy reliability and continuity of critical operations in regions that lose access to grid power during emergencies and in remote regions, including Low-Income communities, that are permanently off-grid.

