

Fuel Cell Power System for Telecommunications

Niche Opportunities for Propane

uel cells have the potential to revolutionize the way electricity is produced, offering greater reliability and a cleaner, more efficient alternative to the traditional combustion engine. Additionally, fuel cells have the ability to satisfy the ever-growing demands for power, particularly in the telecommunications industry. Propane is emerging as an attractive choice for fueling this new technology, preeminently in rural and remote areas where a robust network of propane suppliers already exists.

Project Description

To promote the use of propane in the telecommunications industry, the Propane Education & Research Council (PERC) funded **Docket 10857**: *Propane Fuel Cell System Feasibility Study for Telecommunications Fuel Cell Power Systems*, which had the following objectives:

- 1. Determine the suitability of propane as a fuel source for use in telecommunications fuel cell system applications.
- 2. Summarize telecommunications demonstration opportunities for an IdaTech fuel cell system utilizing propane as a feedstock.
- 3. Build, install, and field test an IdaTech fuel cell system utilizing propane as a feedstock.

Suitability of Propane Fuel Cell Systems for Telecommunications Applications

The study involved analyzing the market potential for propane fuel cell systems to serve in UPS, backup, and continuous duty applications in the four most promising distributed power telecommunications sectors,

including: Digital Cable Networks, Digital Loop Carriers, Grid-Connected Wireless Networks, and Off-Grid Wireless Networks. The major benefits for utilizing propane-fueled systems include:

- High efficiency
- Reduced noise
- Propane is the most economical fuel for fuel cell systems in rural and remote areas.
- Existing infrastructure: the propane distribution network is reliable
- Improved emissions: propane is especially preferred in remote locations because of environmental concerns over diesel emissions.

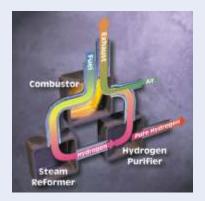
Propane Fuel Cell System

The propane fuel cell system is made up of the following:

- Fuel processor module (FPMTM)
- Fuel cell
- Power electronics package
- Appurtenant equipment

The FPM[™] is comprised of an integrated steam reformer and hydrogen purifier capable of reforming vapor propane into greater than 99.9% pure hydrogen.

IdaTech Fuel Processor Module







Telecommunications Demonstration Opportunities

Near-term challenges to penetrating telecommunications markets are cost reduction, customer awareness, and code compliance. Telecommunications codes and standards are among the most rigorous of any industry, and will require a large investment of time and resources to reach compliance. Meanwhile, niche opportunities exist in the following areas:

- Primary power and hybrid-primary power: the best near-term opportunity is in remote applications for continuous and intermittent operation.
- Backup applications: extended run (greater than eight hours) could provide an increase in year-round propane sales.
- Rural and remote markets: there is additional potential to use fuel cells in duty cycles that can accumulate far more operating hours than natural gas backup systems. These include battery-hybrid duty and seasonal continuous duty.

The highest-value opportunities are located in remote areas with limited access to wind and solar resources that also have noise and emissions restrictions. The most serious inquiries from the telecommunications industry have been tied to restricted area operation in National Parks and other public land areas.

Telecommunications Field Test

A 3.6 kW (gross DC electrical) propane fueled system was developed and installed at a wireless telecommunication repeater station in the Cascade mountain range. Details and results from the field test include the following:

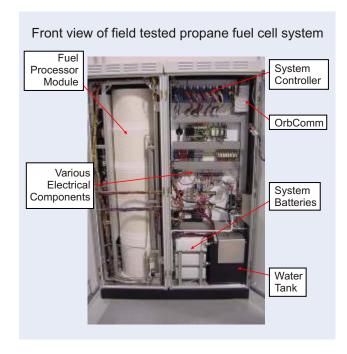
- Proton exchange membrane (PEM) technology was utilized for generating electricity in the fuel cell.
- 68 consecutive days of operation; 1080 hours in a battery charging mode.
- Various operational scenarios common to off-grid telecom sites were experienced.
- Diverse environment for testing and evaluation was provided by the system's placement at 6,200 feet above sea level.

- Positive feedback was received during a demonstration to the Northwest Propane Gas Association (Oregon, Washington, Hawaii and Alaska).
- Continuing the work from previous grants, IdaTech was able to reduce the system supply pressure from 200 psig to 80 psig in less than one year.

PERC funding combined with projects leveraged in Europe has enabled IdaTech to make great strides in commercializing a propane fuel cell system for the telecom market. The success of this project led to additional IdaTech expenditures for ongoing development of propane fuel cell systems for off-grid telecom applications.

Future Field Tests

Following completion of the 3.6 kW system, IdaTech has completed development of a fourth-generation fuel processor module that is being installed in sixteen locations in Europe. IdaTech is working aggressively to commercialize systems like these for telecom, small commercial/industrial, and multi-dwelling applications.



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