



Preventing Wildfires with Microgrids

Remote Grid Innovation in California

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Wildfire smoke prematurely killed over 50,000 Californians in a decade - study

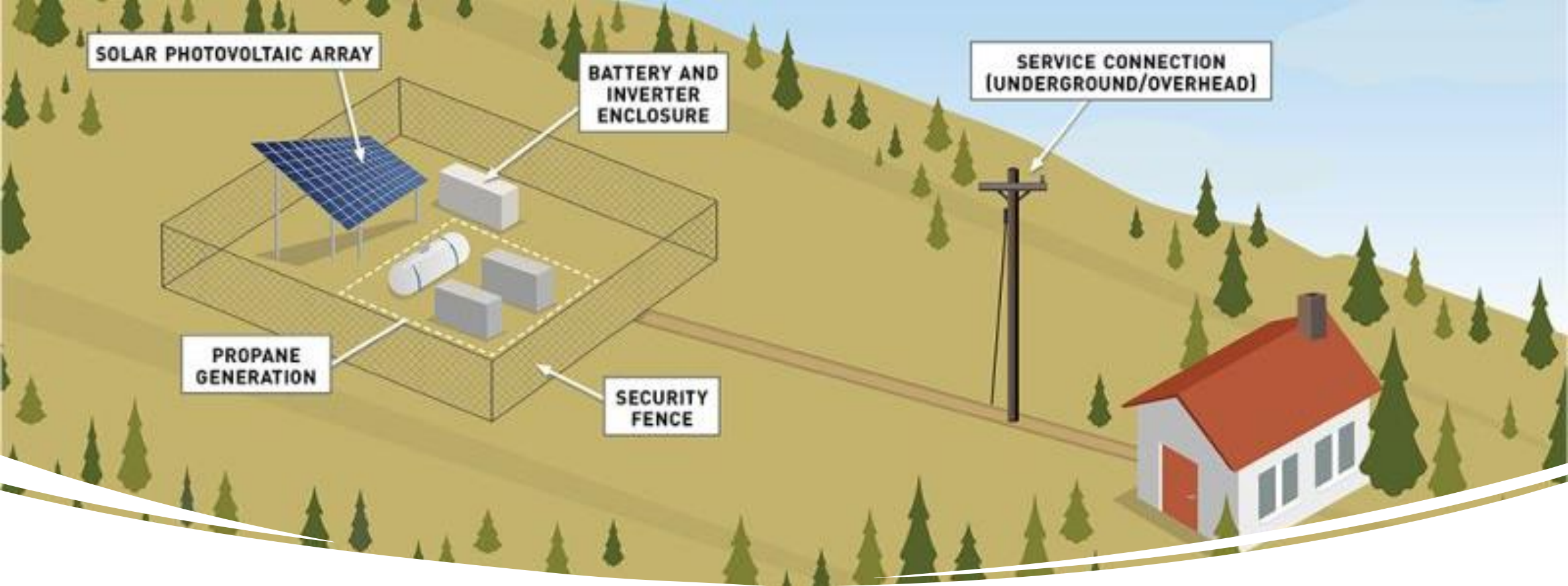
Warren Buffett's PacifiCorp faces \$30 billion of new wildfire claims

Southern California Edison faces \$550M in penalties for 5 wildfires

Wildfires Caused by Electrical Power Account for 19 Percent of Cal Fire-Reported Acres Burned 2016 Through 2020

PG&E reaches \$13.5B settlement with wildfire victims, including Tubbs, Butte and Camp blazes

A motorists on Highway 101 watches flames from the Thomas fire leap above the roadway north of Ventura, Calif., on Dec. 6, 2017. (AP Photo/Noah Berger, File)



What is a Remote Grid?

- Small loads between 5-150kw
- Standalone, decentralized, non-wired
- On edge of distribution system
- Power provided by batteries charged by solar with backup LPG generator

Why Deploy Remote Grids?

- Component of overall System Hardening Program for wildfire mitigation
- Reduce fire risk in High Fire Threat Districts by reducing miles of overhead distribution lines
- Reduce capital cost of fire hardening and/or rebuilding lines due to fire risk or previous damage
- Provide benefits for ratepayers subsidizing long lines that serve a minimal number of customers
- Reduce maintenance costs and liabilities



Design Factors

- 70% renewable fraction
- 10-year minimum lifespan
- Utility-grade security fence with alternate “rustic” custom design for residence and sound dampening
- Year-round vehicle access
- 30 foot clear zone + 70ft reduced fuel zone



Standardized Equipment Solution = Consistent, Transparent Pricing

- Battery Energy Storage System
 - Remote monitoring
 - Fully assembled cabinet at factory shipped to site
 - Industry-leading fully integrated fire suppression and HVAC
 - Island or grid-tied mode
- LPG generator at most sites (some with secondary backup gen)
- Modular solar racking
- Standardized Bill of Materials for Small, Medium, Large system sizing



Operations and Maintenance Requirements

- 10 year full O&M agreement for each site
 - Must be able to source warranties and service agreements from suppliers
 - Twice annual technical visits for equipment cleaning, service, vegetation management, etc.
- Requires 24-hour monitoring and remote troubleshooting
- Ability to arrive onsite in short timeframes to meet reliability requirements – 99.7% availability
- Monthly reporting and annual performance testing

