

# Are Microgrids the Path to a Renewable Future?

*Sponsored by Empower Our Future*

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# HOMER Energy by UL

## Designing Hybrid Systems for over 25 years

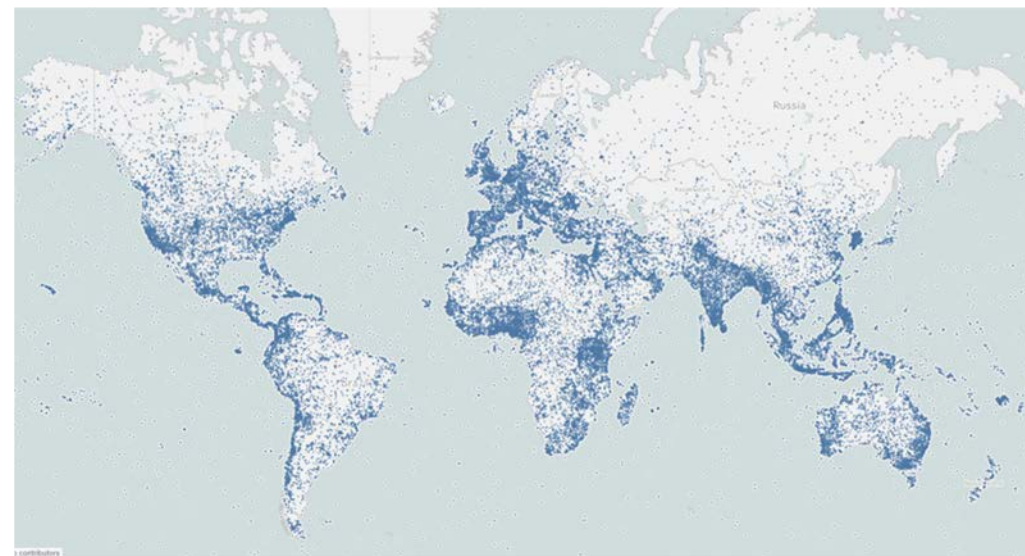
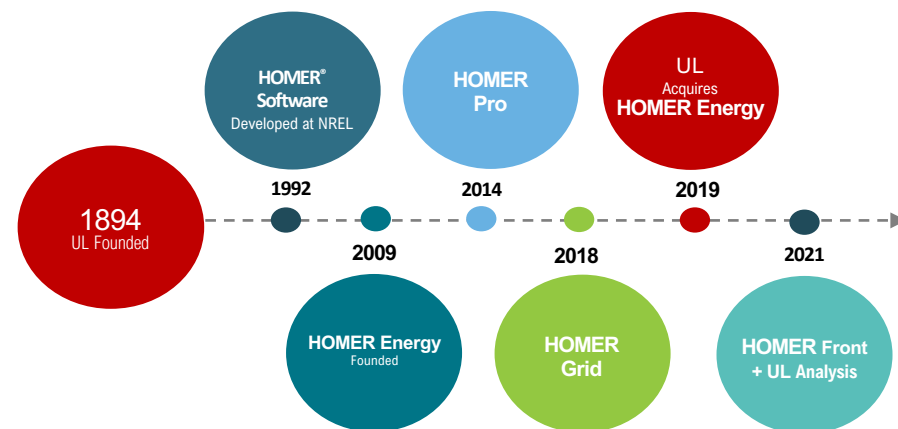
- 1992 – NREL created Village Power Program
  - Response to Earth Summit in Rio
- 2009 – HOMER Energy spun off with exclusive license
- 2019 – Acquired by UL

## De-facto Global Standard

- >250,000 people have used HOMER
- >100,000 opted-in to our hybrid system design network
- Microgridnews.com

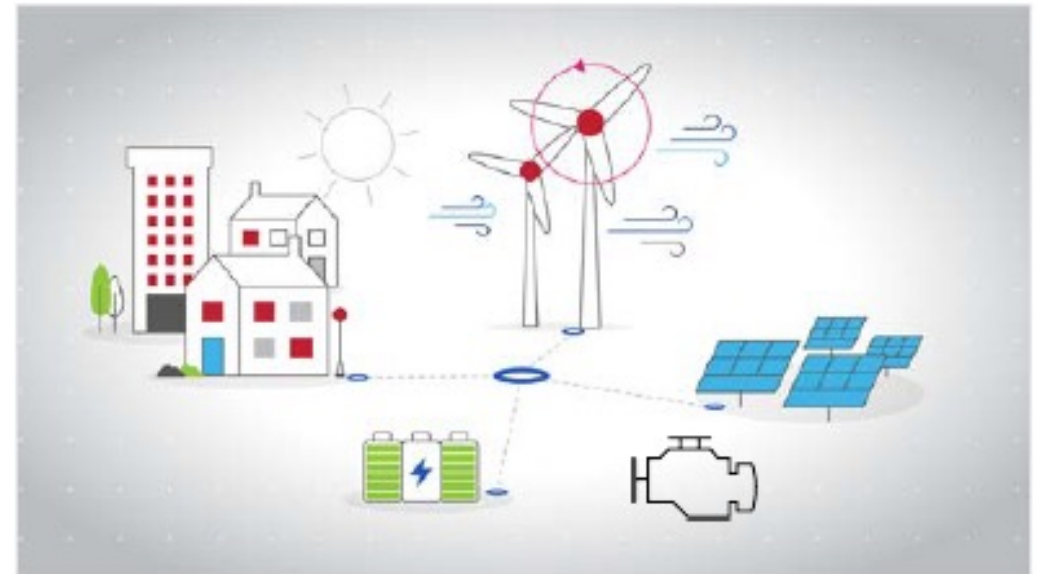
## Global Data

- >4 million HOMER files
- >90,000 projects modeled since 2014



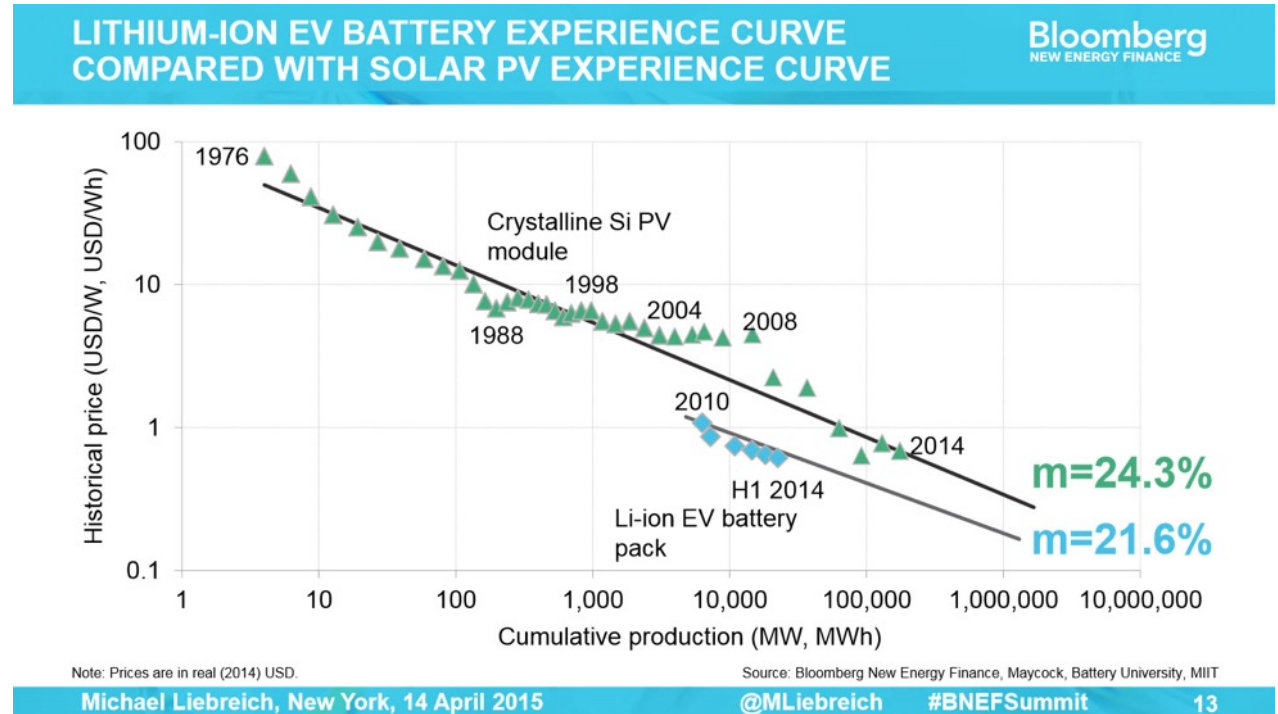
# What is a microgrid?

- A power system capable of standing on its own
  - Remote or grid-connected
  - Tiny or tens of MWs
- Not all distributed generation is a microgrid
  - Net metering is not a microgrid
  - Net Zero is not zero
- High renewable penetration
  - Distributed vs. centralized power
    - Resilience
    - T&D issues



# High RE Penetration Microgrids

- Global lessons
  - Flexibility
  - Storage
  - Control & communications
  - Power electronics
  - Load management
  - Monitoring
- Cost reductions
- Supply chain



# The 100% Challenge

- 20% challenge
  - No storage, cost-effective today without modification
- 50% challenge
  - 2-4 hours of storage, cost-effective in most places today with significant operational changes
- 90% challenge
  - 12 hours of storage, technically feasible, but very expensive
- 100% challenge
  - Seasonal storage ???

# Village Power



1 billion people with no power  
Innovation at small scale

# Islanded Power Systems

- Tens of thousands of islands
- Burning diesel 24/7
- Alaska
- Australia
- Caribbean
- Pacific
- Philippines
- Indonesia
- ...



# Grid-connected microgrids

- Campuses
- Resilience for commercial & industrial facilities
- Tesla Solarwall (& competitors) for residences
  
- California wildfires
- Texas freeze
- East coast hurricanes
- Cyber attacks



Ehrlich Toyota dealer in Greeley



# What would help?

- Microgrids for resilience
- Flexibility
  - Load management
    - Thermal loads
      - Air conditioning, heating, water heating/pumping
  - Beneficial electrification
  - Electric Vehicles

*The views and opinions expressed in this work are those of the author's and do not represent the official position of UL.*