HOMER Energy

Optimizing Storage Design

Dr. Peter Lilienthal

CEO, HOMER Energy

IPS Connect 2018

Maui, Hawaii

October 20, 2018

HOMER Energy

The Future of Power

Solar and Storage are both inherently distributed

Isolated Power Systems are the vanguard

HOMER Energy

Renewables Evolution

- Where are the real economics?
  - It started with diesel displacement
- Entering a new era
  - Cost-effective storage changes everything
- How do you create high penetrations?
  - Hint: Microgrids have been doing it for years

HOMER Energy

Technology Evolution

What used to be

- Early wind-based systems
- Lead batteries
- Unreliable inverters
- No monitoring
- Grant projects without community engagement

What works better today

- Inexpensive solar
- Hybrid technologies
- More & better storage choices
- Reliable electronics
- Remote monitoring
- Real commercial approach

HOMER Energy

Microgrid Evolution

First cost-effective markets

- Start small
- Perfect the technology
- Deliver reliable, high quality power

HOMER Energy

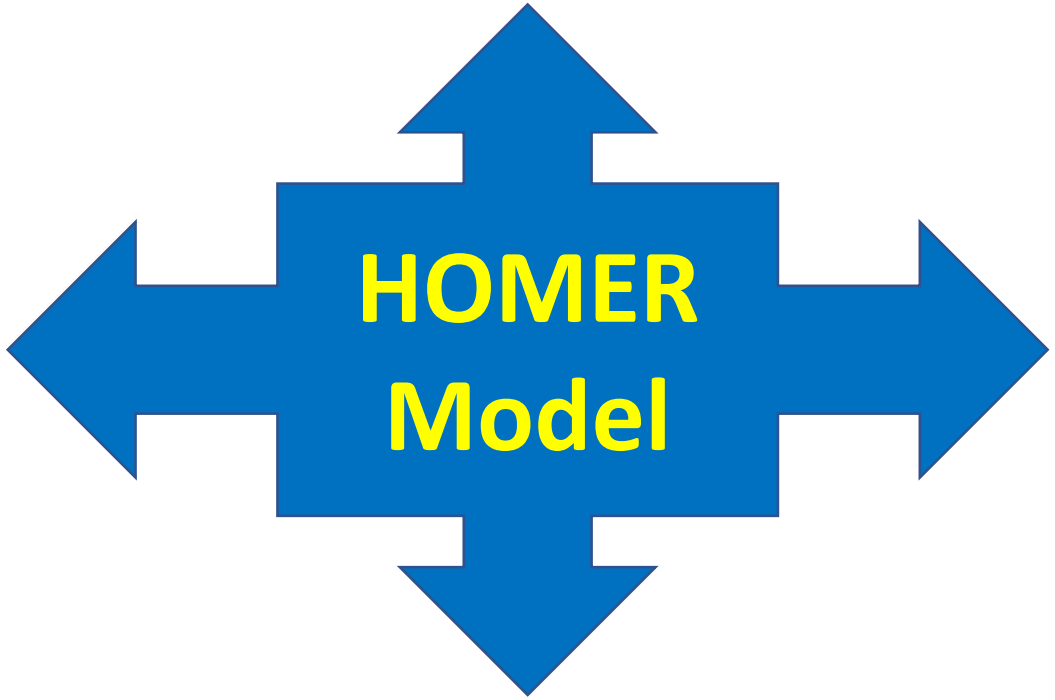
HOMER's Evolution

- 1992 – Earth Summit in Rio
  - NREL creates Village Power Program
  - HOMER as research tool for small, off grid systems
- 1998 – HOMER available to the public
- 2001 – HOMER 2 for larger island systems, CHP, DG
- 2009 – HOMER Energy spins-off from NREL
- 2014 – HOMER Pro
- 2016 – Advanced Storage Module
- 2017 – HOMER APIs; SaaS & Controllers
- 2018 – HOMER Grid released

HOMER as a communication tool

Renewable Advocates

Power Engineers



Financiers

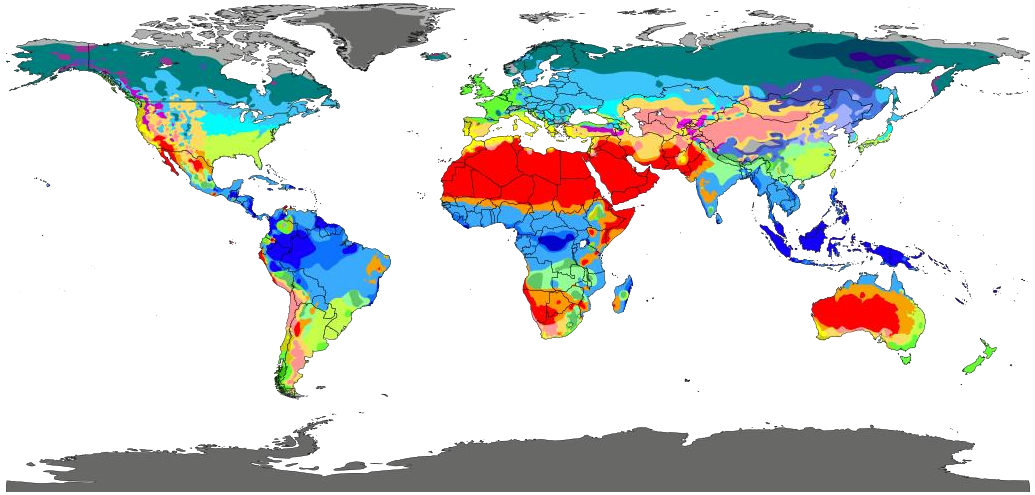
Diesel Mechanics

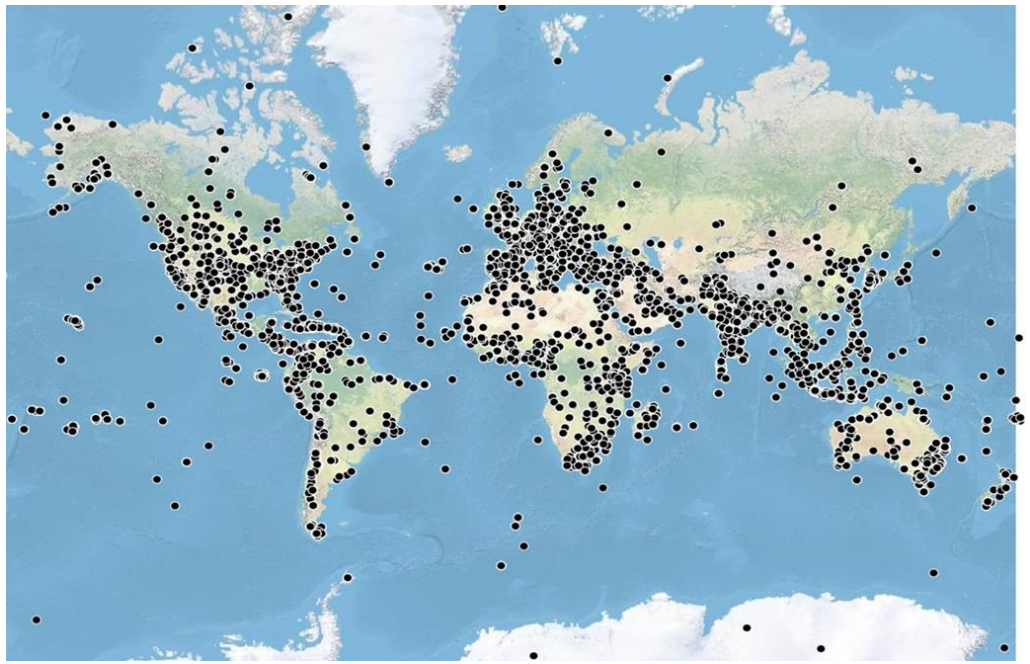
HOMER bridges different worlds

http://www.homerenergy.com

Global Data

- HOMER users access
  - Resource data
  - Load data
  - Tariff data
- We collect project data
  - 50,000 projects under development
  - 1.7 million files





http://www.homerenergy.com

HOMER Energy

Three Phases of Project Development

1. Does this project make potential sense?
   - What would it approximately look like?
   - Should I invest resources in better data, conversations with vendors
2. Choose between specific equipment choices
   - Use measured data
   - Secure financing
3. Final Design
   - EPC contract
   - Engineering drawings
   - Protection schemes, …

HOMER is for first 2 phases

HOMER Energy

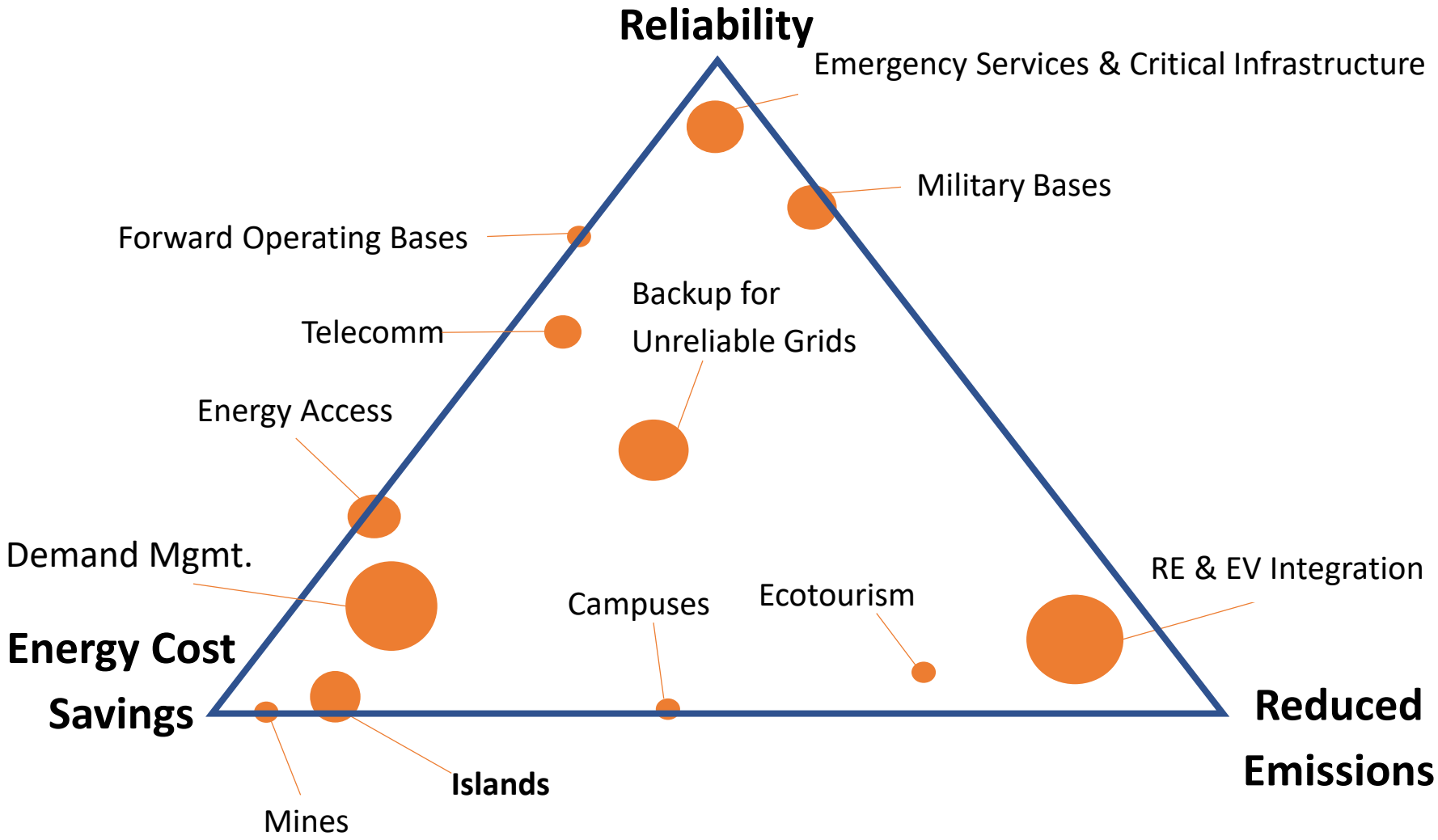
Storage Value Streams

- Distributed Values
  - Demand charge management
  - Time-Of-Use rates
  - Renewable integration
    - Self consumption
  - Voltage & VAR support
  - **Resilience**
- Location-agnostic Values (until there's an outage)
  - Spinning reserve
  - Frequency regulation

- Understanding the trade-offs is crucial

HOMER Energy

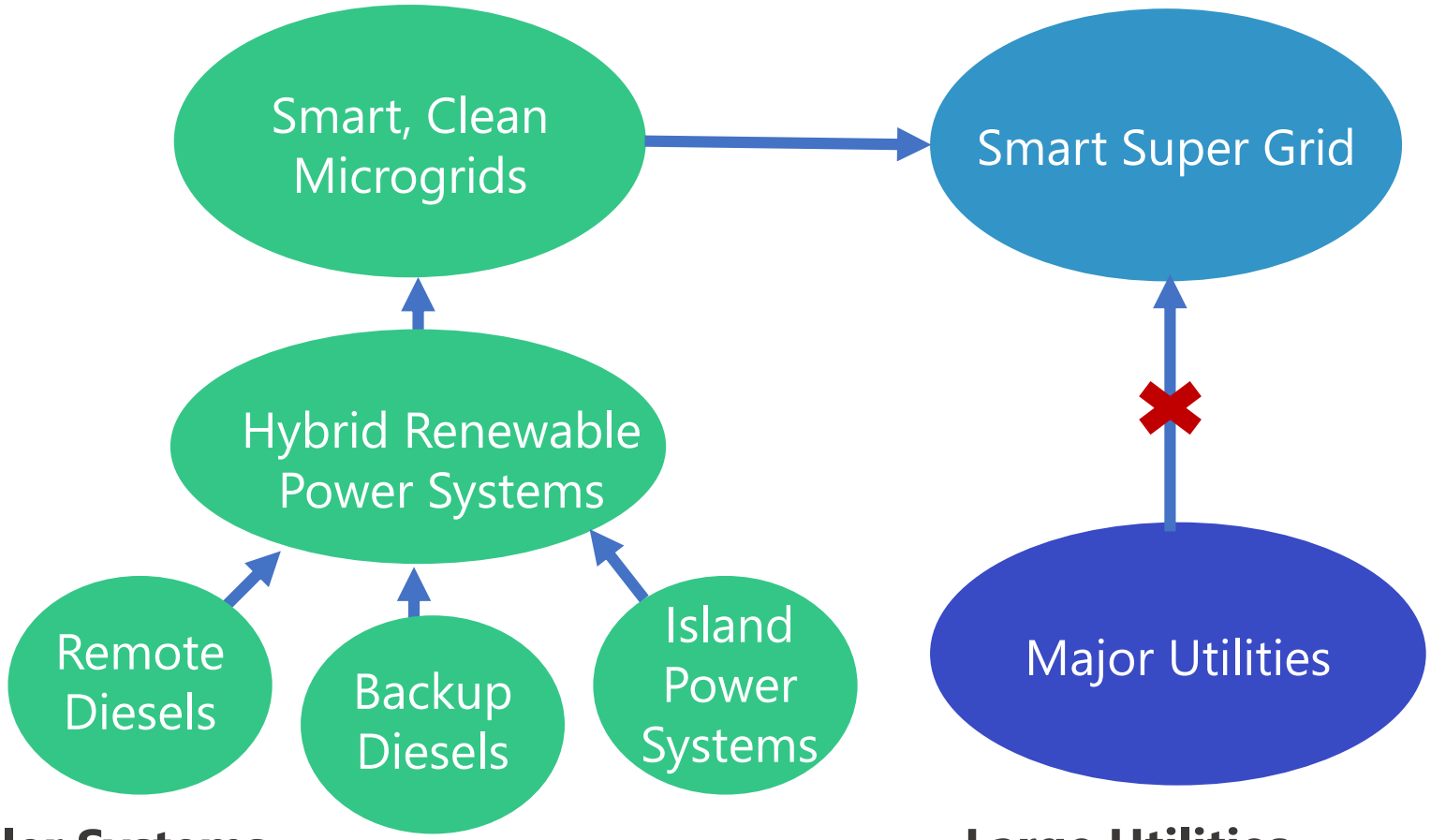
Microgrid Value Propositions



http://www.homerenergy.com

HOMER Energy

Power Industry Evolution



Smaller Systems
- Liquid fuels from oil
- High renewable penetrations

Large Utilities
- Security obstacles
- Regulatory obstacles

http://www.homerenergy.com

HOMER Energy

Conclusion

- Innovations from IPS' are becoming valuable everywhere
  - The sun shines everywhere
  - Improvements in storage have changed everything
- Learn from diverse global applications

- Microgrids can supply high quality, reliable power
- The future is distributed

We are the high penetration vanguard!