



HOMER Energy
by UL

The Odyssey of HOMER Software



October 12, 2020 | Peter Lilienthal, Ph.D., CEO, HOMER Energy & Global Microgrid Lead, UL



Before HOMER

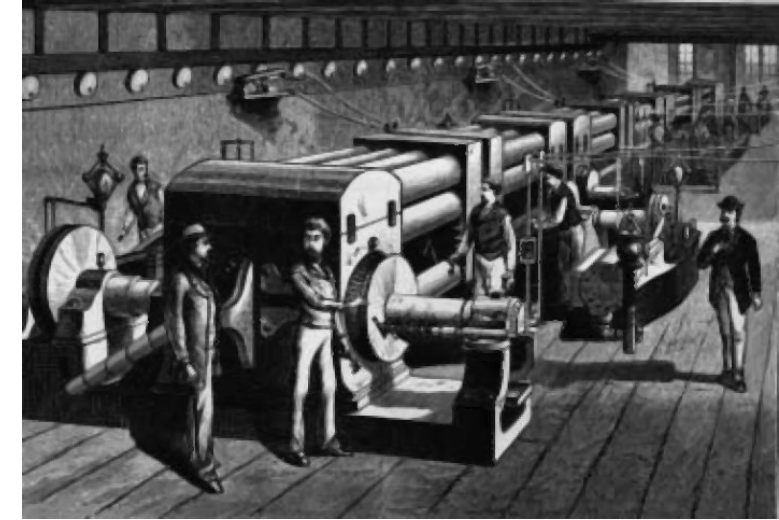
The First Microgrid 1882

Telluride, Co. 1890

- First use of AC in the US
- First Electric Utility

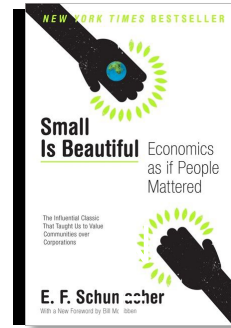
Niagara Falls 1895

- First long-distance transmission
- Economies of scale in thermal plants killed DERs & the microgrid
- Public Utilities Regulatory Policies Act 1978 started the revival

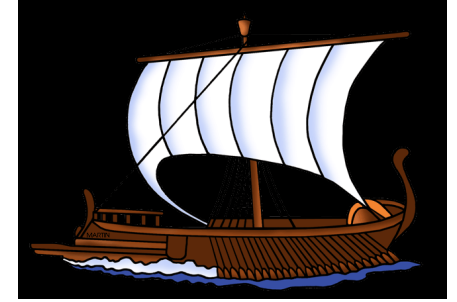


Diseconomies of Scale

- Small is Beautiful
 - (E.F. Schumacher)
- 6 D's of the Energy Future



HOMER's Odyssey



	Hybrid Power Market	HOMER
1992	Research and pilot projects, Village Power Program	Earth Summit in Rio, GAMS on a UNIX workstation
1997	Increased interest in hybrid power systems for energy access	C++ on any Windows machine
2001	Islands and remote villages in Alaska and Australia	HOMER 2
2008	Glimmers of commercial potential	Spun off HOMER Energy
2014	PV prices plummet, DERs become cost-effective	HOMER Pro
2018	Resilience	HOMER Grid
2019	Storage prices plummet	Acquired by UL
2020	Huge hybrid projects under development	HOMER FM (Front of the Meter)

Lessons from Early Renewable Microgrids



Xcalac, Mexico 1992

- Ownership
- Management
- Support
- Energy efficiency
- Metering
- Local conditions
- Salt environment

San Juanico, Mexico 1999

- Significant technical losses



Lessons from Early Renewable Microgrids



St. Paul, Alaska

- Island in the Bering Sea
- Commercial project
- Lead-acid batteries are the weak link
 - Designed without batteries
- Excess wind is used for heating
- System runs without diesels weeks at a time



Wales, Alaska

- Remote community on the Bering Strait
- A little bit of storage goes a long way
- Small high-power battery
- Excess wind used for heating and hot water
- Operation with all diesels turned off
- Remote monitoring is crucial



Retrofitting Diesel-Powered Utilities

- Tens of thousand of inhabited islands
 - Indonesia
 - Philippines
 - Caribbean
 - Pacific
 - Greece
 - Arctic villages
- 10's of kW's – 100's of MW's
- Burning diesel 24/7
- Existing infrastructure



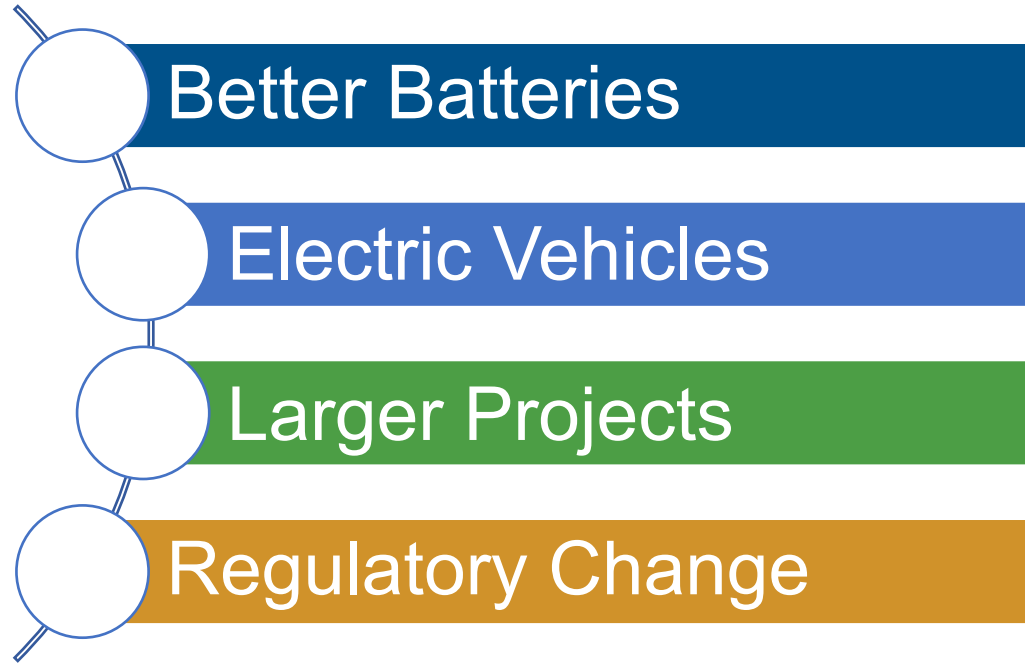
Grid-connected Microgrids

- Hurricane Sandy & the need for resilience
- More hurricanes
- Wildfires
- Ice storms, earthquakes, terrorist & cyber attacks, coronal mass eruptions
- Military
- Campuses
- Emergency services, critical infrastructure



HOMER Energy
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Accelerating Change



Microgrids in the Post-COVID Future

Local expertise



Virtual training & monitoring



Tools.PoweringHealth.org



POWERING HEALTH
Electrification Options for Developing Country Health Facilities

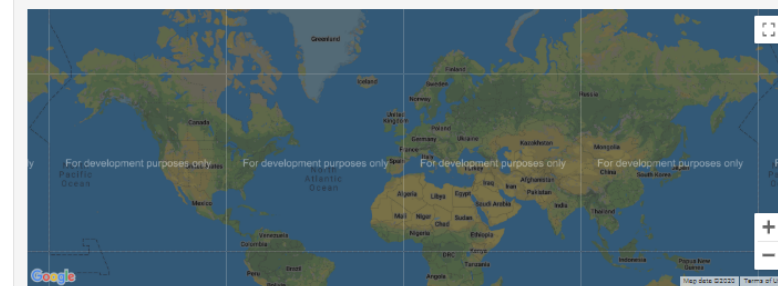
Health Clinic Power System Design

This online software tool uses HOMER Energy's HOMER® optimization model to assist health care providers design appropriate power systems for their rural health clinics using combinations of diesel generators, utility power grids, batteries and photovoltaic arrays. Additional information: "Powering Health: Electrification Options for Rural Health Centers" (PDF 600 KB)

Follow the numbered steps below to run a HOMER® analysis.

1. Location and Time Zone - Use the map to indicate your approximate location [\(more info\)](#)
2. Power Assumptions - Override the default values for the cost and availability of the electric grid, any on-site power generation with local values if known. [\(more info\)](#)
3. Financial Assumptions - Enter the Real Interest rate [\(more info\)](#)
4. Electric Load Inputs - Enter the type and number of electrical devices used in the health clinic and the time of day they are used. [\(more info\)](#)
5. Run HOMER® [\(more info\)](#)

1) Location and Time Zone



Microgrids Lead the Way to Our Clean Power Future

