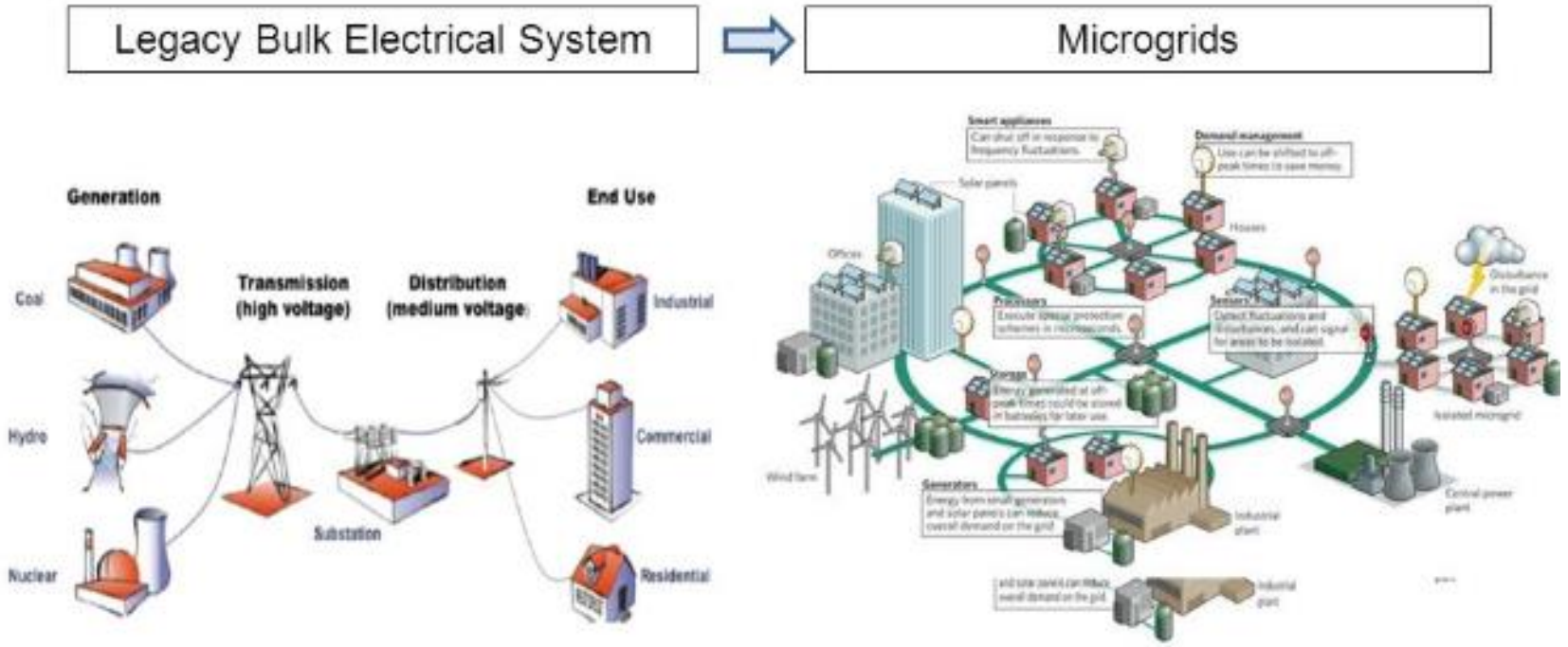
HOMER
Energy

Global Transformation of the Electric Grid



That Was Then…

…This is Now

HOMER Energy

Just What is a Microgrid

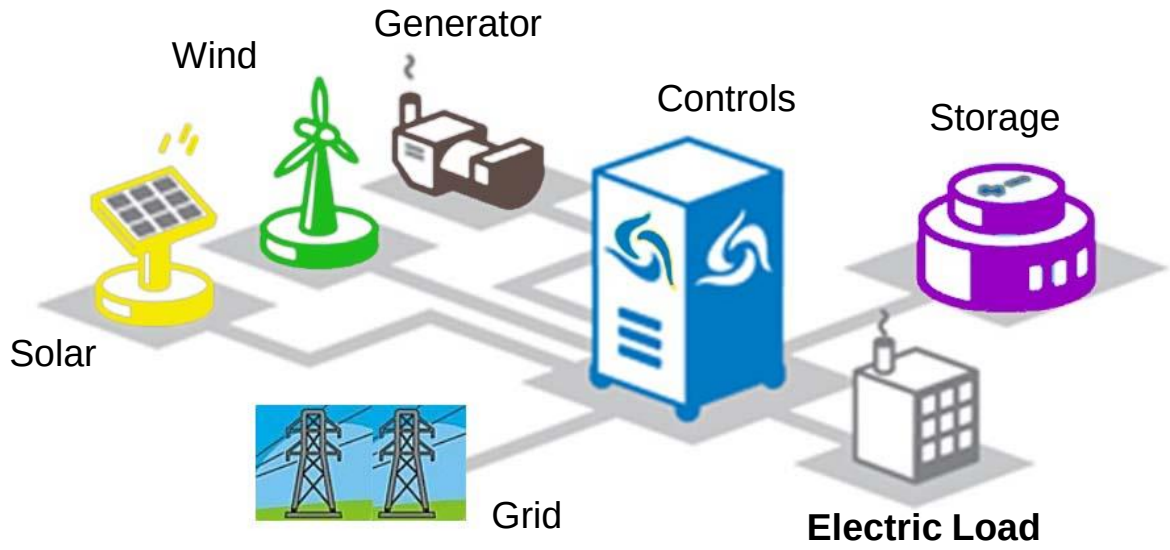
Modern microgrids include multiple generation/storage resources that continuously provide energy for a specific application.

A microgrid can be connected to a larger grid or operate independently without the need of the main grid.

Reasons for microgrids:

- Improved resiliency
- Economics
- Clean energy mandate
- Grid firming
- Peak demand reduction

A microgrid ranges in size from 2-3 KW to over 100 MW. They comprise of any combination of the following technologies:



HOMER Energy

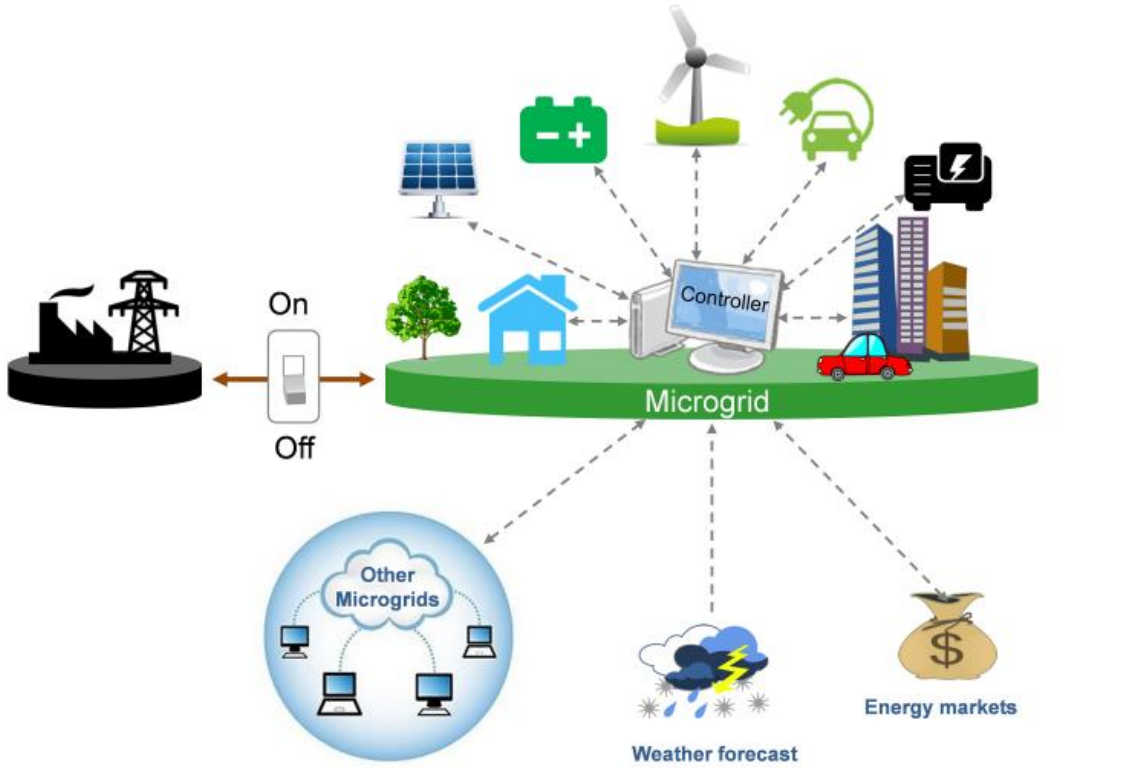
Microgrid Applications

Off-Grid Microgrids

- Telecom sites
- Remote homes
- Forward operating bases
- Villages and small communities
- Island-Nations
- Mining operations

On-grid Microgrids

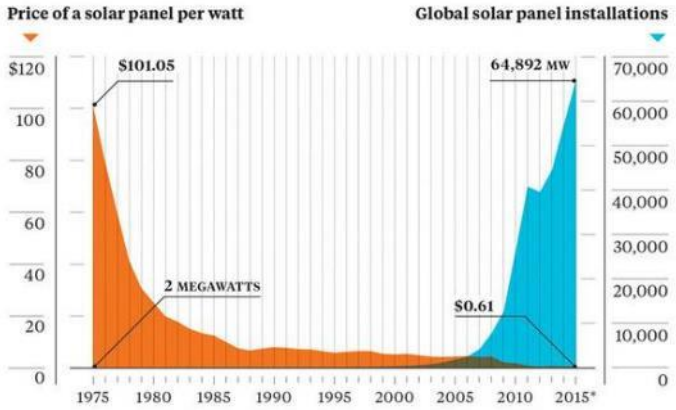
- Hospitals
- University campuses
- Data centers
- Communities
- Factories and offices
- Hotels
- Critical asset infrastructure
- End-of the line grid support
- Homes



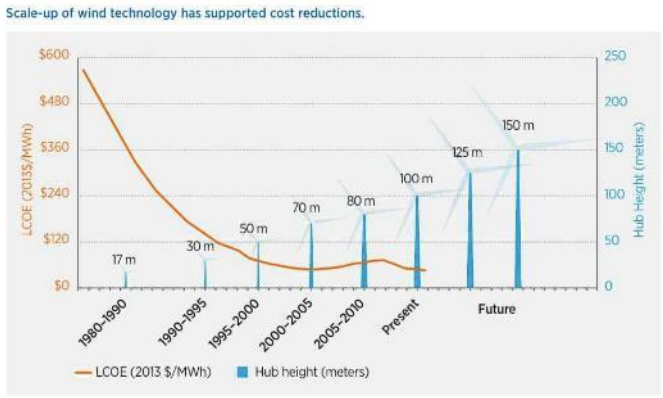
HOMER Energy

Why is this Transformation Happening?

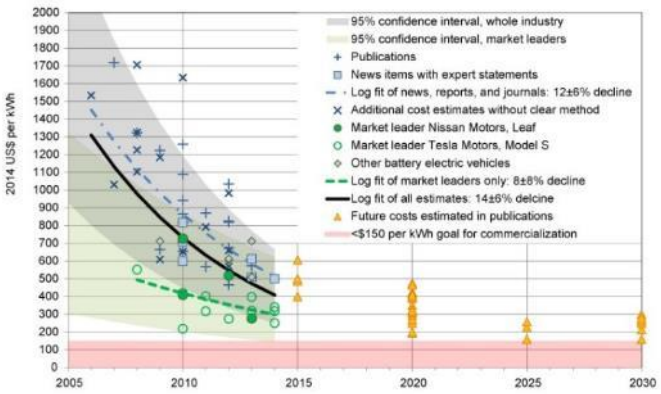
Modern hybridized microgrids are growing today because of one primary reason: economics.



SOLAR



WIND



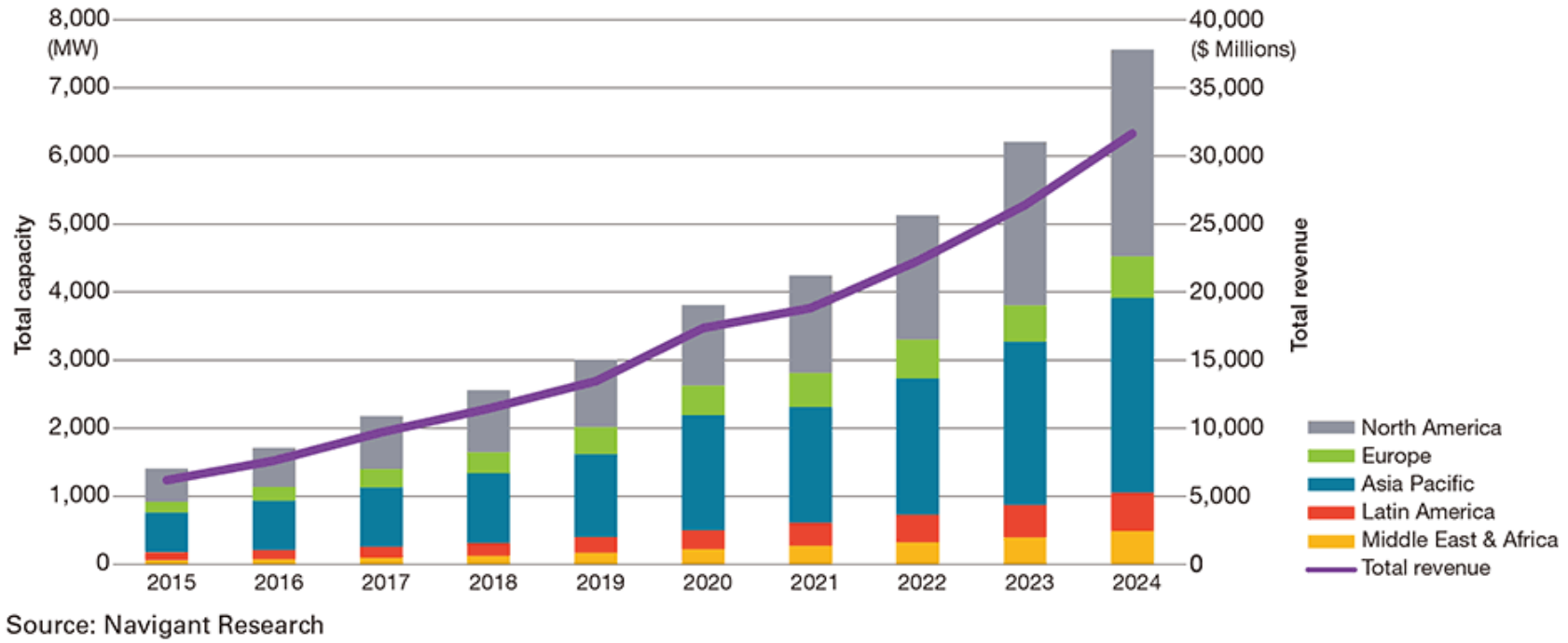
STORAGE

In just the last decade, the cost of solar and wind have declined by as much as 90% and storage over 50%. They are fast becoming mature, bankable technologies.

A standard Power Purchase Agreement for:
Wind: $.04/kWh (USD)
Solar: $.06/kWh (USD)

HOMER Energy

What the Experts say about the Future



Source: Navigant Research

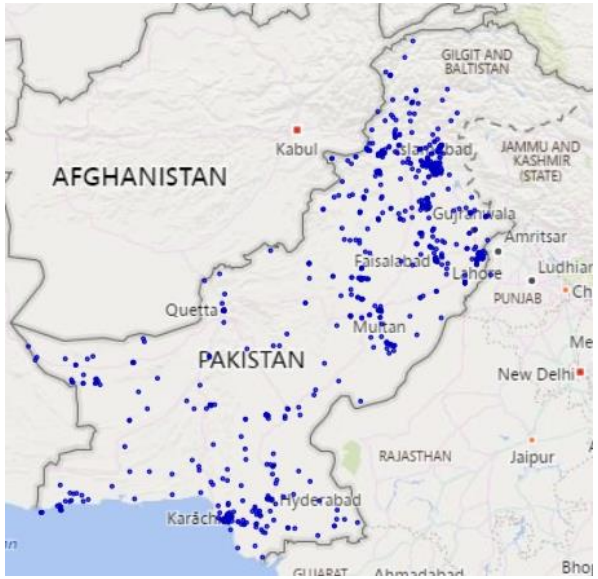
"The global microgrid market will rise from $9.8B in 2013 to $35B by 2020"

—Transparency Market Research

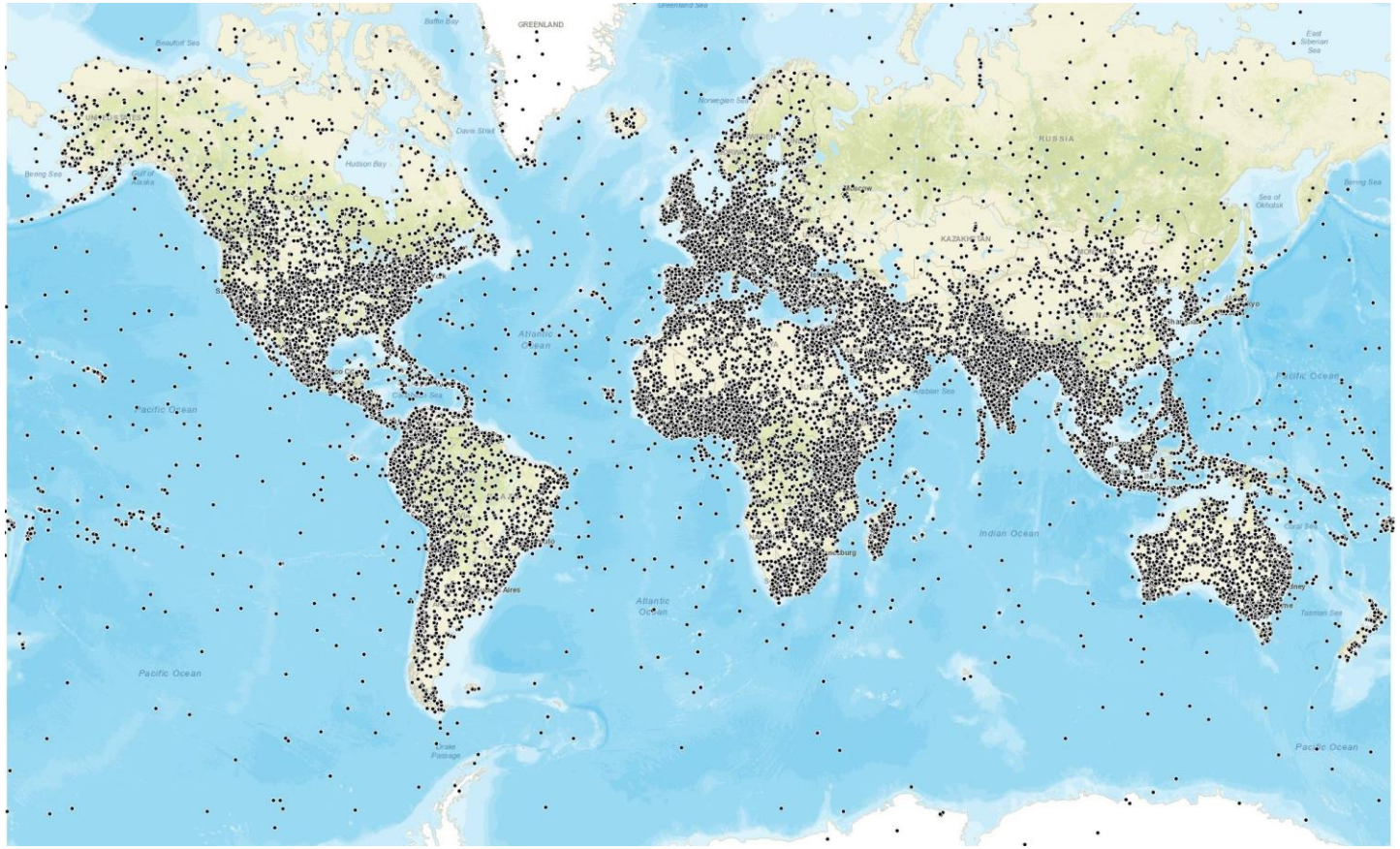
HOMER Energy

HOMER Energy

In only the last five years more than 70,000 microgrids have been considered using HOMER software

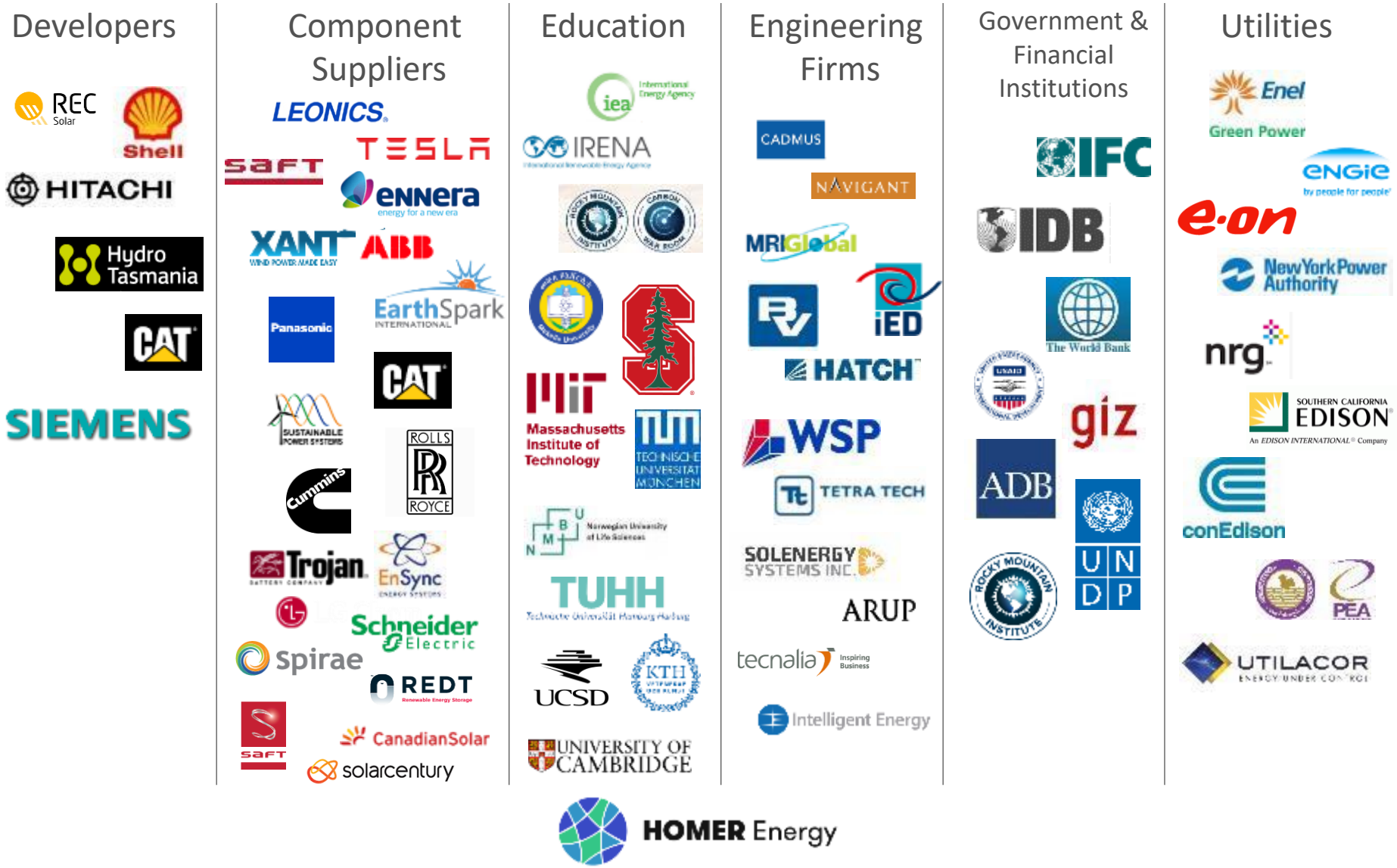


Over 650 microgrids have been considered in Pakistan



HOMER Energy

A few Companies Investing in Microgrids



But What Technologies are Best?

The question is how much of what energy generation and storage technologies make the most economic sense?

- It depends on:
  - Available resources
  - Size and variability of loads
  - Equipment prices
  - Equipment performance/maintenance
  - Grid or no grid
  - On the ground conditions

How you get there is through Economic Optimization Modeling

HOMER Energy

HOMER = **H**ybrid **O**ptimization of **M**ultiple **E**nergy **R**esources

- Technology **agnostic software** platform. Model virtually **any type & combination** of distributed energy generation and storage technologies
- Simulates **real-world performance** and delivers a choice of **optimized designs**

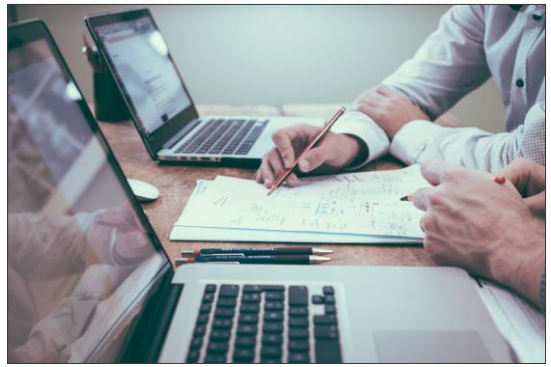
HOMER Energy is the leading software company for **Economic Optimization** for Microgrids and Demand Charge reduction in DER applications to understand least cost solutions.




HOMER Energy

HOMER® Pro

- Technology agnostic platform provides accurate, unbiased results
- Simplifies the complex process of determining lowest COE for microgrid and DER systems when considering multiple technologies
- Capable of modeling virtually any combination of energy generation and storage technology. Customize models to meet your specific needs
- Simulates the design with real-life resources, load data, and components operational costs
- Compare thousands of possibilities in a single model run
- Sensitivity analysis that allow for “what-if” scenarios through out the model. What-if fuel prices increase by 20% in five years?



HOMER Energy

HOMER PRO – How it Works

Project Inputs

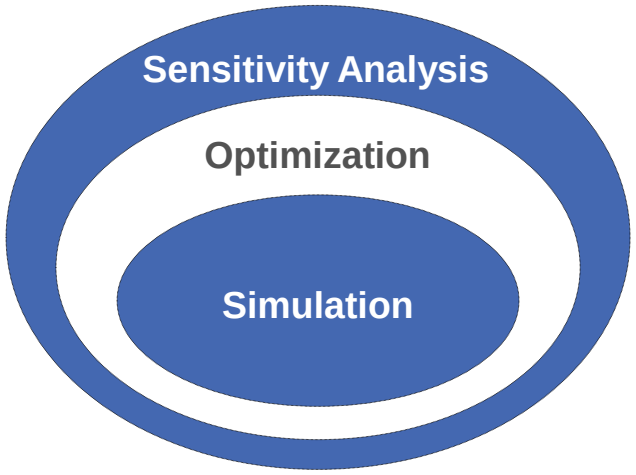
Load Profile

Site-Specific Resources

System Components

Analysis

HOMER Pro



Results

Economic & Engineering

System Sizing

Performance Details

Financials

Various Reports

HOMER Energy

Consulting Services

Over the last two decades HOMER Energy has provided consulting services for companies and governments around the world as a leader in the areas of microgrids. A sample of our projects include:

- **IRENA** Report – minigrids technology Outlook
- **Asian Development Bank** HOMER Pro Training program 2015
- Hôpital Universitaire de **Mirebalais** 2014-2015
- **Inter-American Development Bank** (IDB) Sustainable Energy for Haiti 2014
- **World Bank** Eastern Caribbean Energy Regulatory Authority (ECERA), 2014
- **Fort Bragg** Analysis of Generation Alternatives, 2012
- **Necker Island** Conceptual Design and RFP Support, 2012
- **Carbon War Room** Island Initiative in Aruba, 2011
- Professional Capacity Development Using the HOMER Software for Hybrid Renewable Power Systems in **Colombia**, 2014
- Resource Mix and Generation Options for forming a **Boulder** Municipality, 2012 – 2013
- Hybrid Power Feasibility Analysis for 3 Remote **Canadian** Communities, 2012 – 2013
- Electric grid modeling of the Commonwealth of the Northern **Marianas Islands** (CNMI), 2012
- Secretariat of the Pacific Community Island Power Utilities Manager Training for the Federated States of **Micronesia**, 2012
- Renewable Energies for Remote Areas and Islands (REMOTE), 2012
- **PLN Indonesia** Training and Capacity Building in off-grid renewables and rural electrification, 2012
- Integrating Renewable Energy into the Transmission and Distribution System of the **U.S. Virgin Islands**, 2011
- Wind Feasibility Analysis for Telecomm Towers, Southwest Wind Power, 2011, 2012
- Renewable Power Options for Electrical Generation on **Kaua'i**: E**conomics** and Performance Modeling, 2011
- USAID Powering Health, 2010 – Present
- Microgrid Design for Emergency Services in **San Diego**, 2010 – 2011
- Action Plan for **Anguilla**'s National Energy Committee, 2008
- Technical Support for **Alaskan** Wind-Diesel Systems, 2006
- **Bermuda** Electric Light Company - Integration of Distributed Renewable Power Projects into an Island Utility, 2007-2009

HOMER Energy

HOMER Energy Training

- Instructor-led training, available in-person or online.
- Train front-line sales engineers to use HOMER to qualify incoming leads.
- Train inside engineers to use HOMER to conduct competitive analysis of other products.
- Train engineers to use HOMER to establish the primary microgrid design.

HOMER Energy

Try HOMER for Free

Andy Kruse
VP Business Development
HOMER Energy
1790 30th Street, Suite 100
Boulder Colorado 80301

Phone: 928 380 3527
Email: andy@homerenergy.com
Web: www.homerenergy.com

HOMER Grid

https://www.homerenergy.com/products/grid/index.html
HOMER's demand charge reduction tool with utility rate database (United States, Canada and Mexico)

HOMER Pro

https://www.homerenergy.com/homer-pro.html
HOMER's "Flagship product" – Can model virtually any distributed energy generation or storage technology on or off the grid.