

Forbes

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30 UNDER 30



theguardian



Natural disasters are causing grid-instability,  
and conventional solutions are too slow and  
expensive.

# The Problem



BoxPower turns a *complex* microgrid process into  
a *simple* microgrid product



The Solution



# Turnkey Solar Microgrids

*Reliable, Fast, and Affordable.*

*Standardized for Scaling*



**6kW MiniBox**



**24kW SolarContainer**



*The Public Utilities Commission, Independent System Operator, and State Energy Resources Conservation and Development Commission must take action to help transition the microgrid from its current status as a promising emerging technology solution to a successful, cost-effective, safe, and reliable commercial product that helps California meet its future energy goals and provides end-use electricity customers new ways to manage their individual energy needs.* - SB 1339, Section 1(e)



# The Goal

# Technology Features

- Rapidly deployable turnkey solar array
- Pre-wired Lithium battery storage
- Advanced bi-directional inverter system
  - Compliant with UL1741, IEEE 1547
  - Grid Connected Configurations Include Critical Load Backup or Facility Service
- Integrated propane or natural gas generator
  - Direct input to inverter
- Standardized controls and monitoring for performance and compliance

# OEM Partners



# “Who wants a Microgrid?”

- County Resilience Centers
  - 3M+ people in 40 Counties impacted by PSPS
- Medical Clinics
  - 56% lack back-up power
- Residential Back-Up
  - Elderly, vulnerable, and at-risk populations



Direct Relief



# “Wait, what’s a microgrid?”

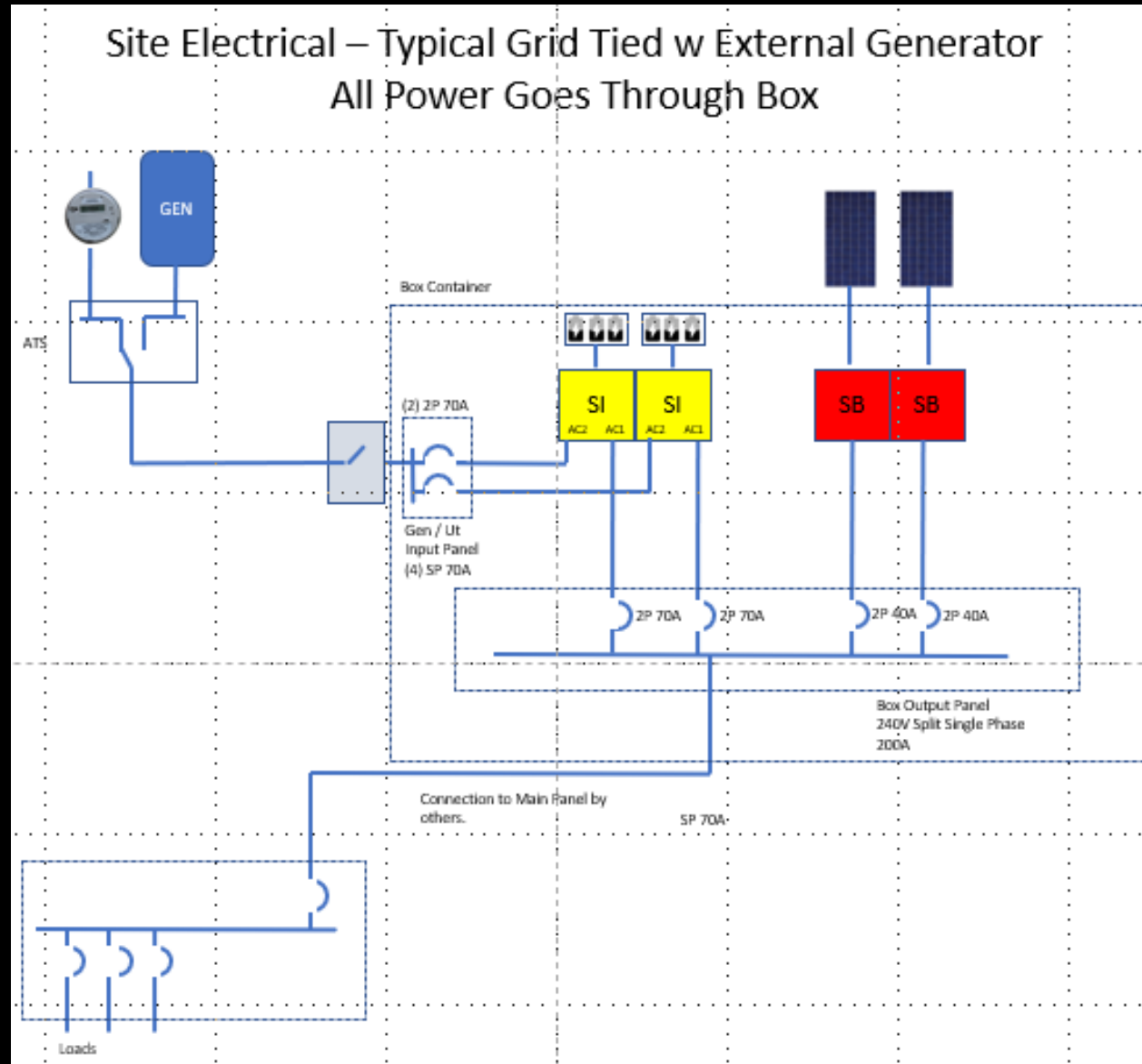
A microgrid is a localized group of electricity sources and loads that normally operates connected to and synchronous with the traditional wide area synchronous grid (Macro grid), but can also disconnect to "island mode" — and function autonomously as physical or economic conditions dictate. (Berkeley Lab)

- No reference to size or application
  - Most industry folk think of university scale microgrid, whereas the majority of interest is from SME and residential
- No reference to export capabilities
  - Is a UPS a microgrid? Aggregated load shedding? Virtual Power Plants?





# “Wait, what is a BoxPower microgrid?”



# Barriers to entry:

- Microgrids typically fail Fast Track Initial Review, Berkeley Labs (2019). Rapid deployment for small systems is critical
  - What is Fastrack Approval/Reject Rate?
  - What is Overall Approval Rate by Size?
  - What is Time to Approval, PG&E's web page says 3 months?...
    - Our GOAL - Should be 2-4 weeks.
    - Puerto Rico's PREPA approval for "Fast Track" is default approved
- Fragmented approval process across the state
  - IOUs vs Munis vs Special Districts
- Conflict between AHJ and Utility approval
  - Catch 22 for permitting
- Difficult for small entities to navigate
  - Customers and installers



# Top Ten Barriers to Microgrid Commercialization as Indicated by Survey. CEC Microgrid Assessment and Recommendations, July 2015

Barrier	Rank	Average score (5 highest)	Status compared to 2015	Impact to BoxPower
Lack of policies or regulations that enable microgrids	1	4.1	Improved	
Interconnection rules impose limitations on microgrids	2	4		Significant
Utility franchise rights inhibit microgrid deployment	3	4		Significant
Existing retail tariffs do not allow all microgrid benefits to be monetized.	4	3.9	Not fully	Significant
High cost of meeting interconnection requirements	5	3.8	Improved	Significant
Lack of direct access to wholesale markets do not allow all microgrid benefits to be monetized	6	3.7		
Lack of utility understanding of the impacts of end user microgrids to the utility	7	3.6	Improved	Significant
Adequacy of IEEE technical standards to address integration and operation of microgrids	8	3.5	Improved	
Lack of clearly defined roles and responsibilities between utility and microgrids	9	3.5	Improved	
Lack of standardized method to establish cost and value of microgrids to various stakeholders	10	3.5		Significant



# Barrier Case Study: Nevada County

The situation: County has already installed 500kW Solar PV on a single account. The other accounts are credited through NEM2A/RES-BCT.

The problem: because they have already met their NEM2A generation limit, they are disincentivized to add additional distributed generation capacity for resilience and power-shut-off purposes.

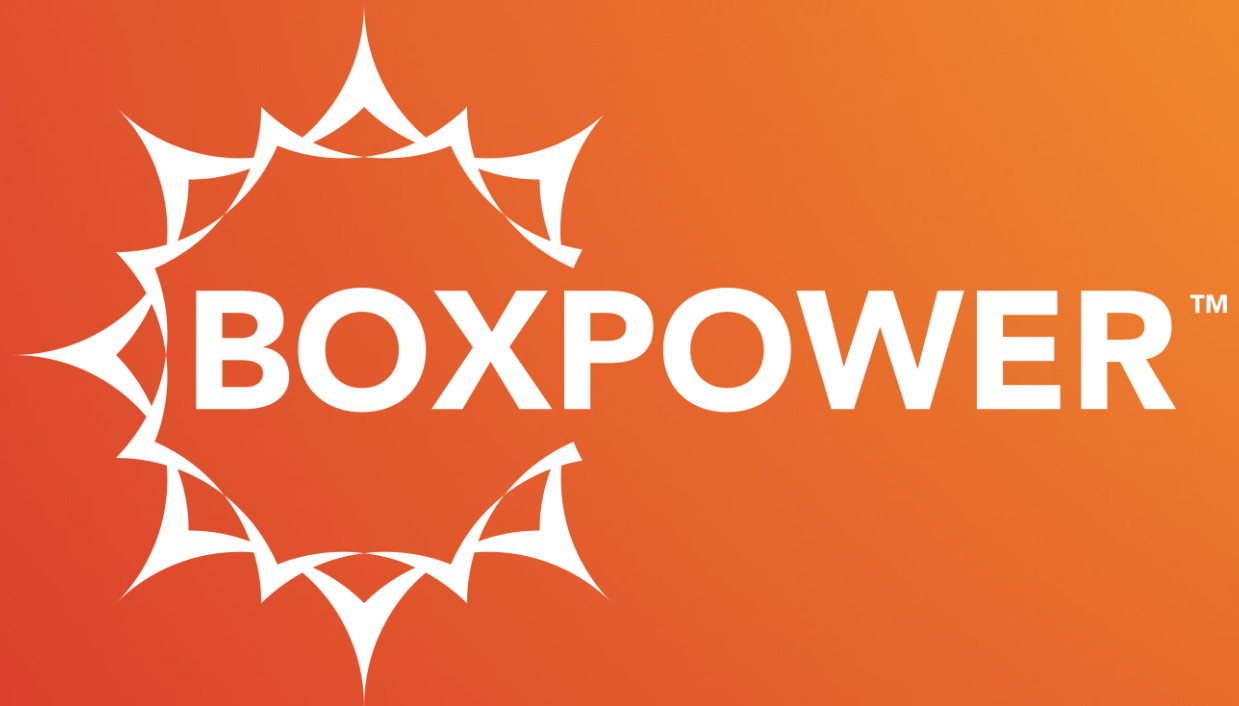
- Customers who are on a summary bill scheme and adding additional solar may be penalized since they may become a net exporter even though one facility may contain all the solar production.
- Other locations lose incentives even though remote, and in need of resiliency.



# Recommendations for Improvement

- We support a template design and approval process for small scale microgrids
- A single entity for reviewing interconnection requirements and process (CAISO?)
- Significant improvement in Fast Track approval times
- Outreach programs for AHJs would help facilitate permitting
- Incentives for customers to adopt clean (non-fossil-fuel) back-up systems for resiliency
  - Air Quality Board collaboration for off setting diesel/gas/propane gen
  - Resilient system rates
  - Financing, Tax Credit extensions, etc.





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