

Case Summary: Off-Grid Cold Storage

LeapEnergy, USA

LEAPENERGY INNOVATION

The gEUDG consists of **3** technologies which enable us to harvest sun power for **6 -9** hours per day in most African countries enabling **24/7** window of cold storage for the effective preservation of most fruits and vegetables a **controlled environment**.

HOW WE DO THIS

We integrate control algorithms to power refrigeration real-time and store enough energy in thermal phase change material (TPCM) and battery bank hybrids.

SUSTAINABILITY

For fruits and vegetables, the unit average electrical operating cost is \$0.24/lb. The unit CAPEX cost for the off-grid cold storage is \$0.49/lb. Thus, in **2** years it pays for itself for what it cost to power one. There is zero electrical operating cost for the off-grid cold storage.

VALUE

DIFFERENTIATION

The small farm holder can sell fruits and vegetables an average of **2.39** times higher when quality and freshness is preserved. This translates to robust economic



In the absence of reliable power on the grid for most countries in the emerging world, they rely on liquid fuels (diesel) to attain sensible power for productive use. As such, electricity cost can be as high as \$0.32/kWh. It is not sustainable and hence a market based solution for cold storage had not been feasible.

LeapEnergy developed an off-grid power platform that provides robust power for productive use anywhere that does not have the grid. Our innovation is called End-Use Distributed Generation EUDG. The off-grid cold storage main power source is EUDG series of products. Our unique innovation has a Levelized Cost of Electricity (LCOE) of \$0.046/kWh. The LCOE is the life cycle cost that accounts for all assets and resources required to produce a unit of electricity. Thus the unit electricity operating cost for this innovation is \$0.001/lb.

The EUDG was launched in 2013 in the USA where it was developed mainly for off-grid applications power source.

- **35 – 50%** of Fruits and Vegetables produced are wasted globally primarily due to the temperature-sensitive nature of these products.
- Small farm holders have little or no access to cold storage yet they produce most of the 1.3 billion tons per year of food wasted.
- At the critical **1st** mile (post-harvest) of the cold chain logistics, we bring unique value with proven off-grid cold storage technology to:
 - Maintain Quality and Freshness
 - Reduce Waste
 - Minimize food safety issues
 - Transparency at post-harvest
 - Efficiency in the supply chain
 - Decrease carbon footprint and increase energy efficiency

Cold Storage Protocols

Pay-As-You ColdStor™: Under this protocol, a farmer/cater/food vendor looks for a cold storage site nearest the place of need and pays \$3.2/100lbs¹ of produce per month. Each site is equipped with special storage bins and a user may acquire multiple bins as needed.

Captive Users: Medium to large scale producers may lease or buy unit(s) of self-storage for their operations and can expect IRR of 55%.

¹ Suggested Storage Fee



gEUDG Features

RECOGNITION

The cold storage innovation received recognition in 2013 when it was selected as the best productive use technology in the 1st USADF and GE Power Africa Off-Grid Energy Challenge. Trans-Africa Gas and Electric submitted the proposal for cold storage use in Jos, Nigeria and won \$100,000 in grant.

33% ENERGY REQUIRED STORED AS TPCM



TURNKEY

We offer a turnkey solution especially to public organizations as governments and NGOs.

CONTACTS

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With an average of 6 to 8 hours of sunlight,

the gEUDG (green End-User Distributed Generation) will harvest enough sun energy to power electrical loads in real-time and store some of the energy in a hybrid mode of ice and batteries sustaining a 24/7 operations.

The features of gEUDG products are:

- Solar Modules
- Charge Controller/Inverter
- Battery
- Thermal Phase Change Material (optional)

We have integrated the best technologies of each feature with control algorithms to attain sustainable cold storage in off-grid regions of the world.

ICE as a storage energy source: 33% of the energy we harvest from the sun is stored in thermal phase change material (TPCM) such as ice and used when needed. The ice also provides a means to pre-cool produce from field temperature before going into storage. This reduces the initial energy load.



gEUDG Series Specifications

Spec Variables	gEUDG1.2kW	gEUDG2.4kW	gEUDG8.0kW
Max. Energy Output kWh/month	276	605	2,131
Cold Storage (ft3)	1,050	2,100	7,200
Storage Capacity (lbs)	13,125	26,000	90,000
Stationary Application			✓
Mobile Application	✓	✓	
Pay-As-You-Store			✓
Lease/Rent	✓	✓	✓

gEUDG are available in the following power specifications:
Voltage 120V or 240V
Frequency 50Hz or 60Hz

Technology Partners and Associations:



About LeapEnergy

We believe in the global access to electricity. The end-use distributed generation (EUDG) platforms are a step in that vision which will leapfrog the grid and enhance "grid" security. We approach our commitment for global access to electricity with a single focus to integrate technologies with geo-global resources.